A SURVEY OF NURSES' KNOWLEDGE OF SLEEP AND ITS ROLE IN PATIENT RECOVERY IN A HOSPITAL CONTEXT

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DECLARATION

I, Marisa Paola Maria Pinna, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Gull's horn book

"For do but consider what an excellent thing sleep is. It is so inestimable a jewel that, if a tyrant would give his crown for an hour's slumber, it cannot be bought; of so beautiful a shape is it that, though a man lie with an empress, his heart cannot be at quiet till he leaves her embracements to be at rest with the other; yea, so greatly indebted are we to this kinsman of Death that we owe the better tributary half of our life to him. And there's good cause why we should do so, for sleep is that golden chain that ties health and our bodies together. Who complains of want, of wounds, of cares, of great men's oppressions, of captivity, whilst he sleepeth? Beggars in their beds take as much pleasure as kings. Can we therefore surfeit on this delicate ambrosia? Can we drink too much of that, whereof to taste too little tumbles us into a churchyard, and to use it but indifferently throws us into Bedlam?" (Dekker in Pendry, 1967: 81).

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ABSTRACT

Knowledge about sleep and circadian rhythms and the importance of sleep and relating factors in patient recovery is essential to nurses.

Aim

The aim of this study was to determine professional nurses' knowledge of sleep and the role of sleep in patient recovery, in a private hospital context.

Setting

This study was conducted in a private hospital in Cape Town, South Africa.

Population and sample

The population for the study comprised only professional nurses who cared for patients during the day or night in hospital (N = 90). Convenience sampling was utilised due to the investigation being limited to a single, medium-sized private hospital. The sample comprised 85 professional nurses who met the inclusion criteria (n = 85).

Research design

The research design is a quantitative non-experimental study and specifically a cross-sectional descriptive study using the survey method.

Data collection

Self-administered questionnaires were distributed, administered and collected by the researcher. The questionnaire comprised 3 categories: knowledge of sleep; demographic profile and professional profile. The data collection instrument included closed, open, single- and multiple-answer questions.

Data management and analysis

85 professinal nurses returned completed questionnaires. The questionnaire data were primarily descriptive. Complete and incomplete questionnaires were coded, marked and analysed according to a memo based on the literature. The analysis included the age range, number of years of experience and knowledge range of the respondents. Frequency distributions were generated and the closed and open questions were evaluated for

correctness and relevance and marked or grouped accordingly. A total score was obtained for each participant by adding up all the correct responses in the "knowledge of sleep" section. Frequency tables were used to describe the sample using the data from the "demographic" and "professional" profile sections. The mean age of the respondents was 44.4 years and the years of nursing experience ranged between 1 year and 41 years, with a mean of 18.58 years.

Three groups of respondents were identified: those who worked day and night duty; those who worked day only and those who worked night only. There were differences in the overall knowledge scores in the three groups: day and night duty - 41%; day duty only - 35.7% and night duty only - 30.8%.

23.5% of the respondents reported having received education specifically related to sleep in their nursing curriculum (mean score 40.2%), 75.3% of the respondents recorded not receiving education specifically related to sleep in their nursing curriculum (mean score 34.8%) and 1.2% of the respondents were unsure (mean score 43.1%).

Education relating to sleep post registration with the SANC was reported by 5 (5.9%) of the respondents. 79 (92.9%) of the respondents reported not receiving any post registration education and 1 (1.2%) was unsure.

Comparisons of mean percentage scores for different categories of other variables were done using ANOVA and regression analyses, provided the percentage data met the requisite normality assumptions which were tested using visual diagnostic tools such as the histogram, and the Shapiro-Wilks test for normality.

Ethical considerations

As this is a survey, no specific risks due to participation occurred. The information letter and questionnaire were available in English and Afrikaans according to the respondent's preference. Ethical aspects applied included: respect for persons; informed consent; autonomy; confidentiality; privacy; justice; veracity; beneficence and nonmaleficence. Participation was anonymous, confidential and voluntary with no penalty and no adverse consequences for non-participation.

Results

The nurses in this study were mainly found to have a limited knowledge of sleep and the role of sleep in patient recovery in a hospital context. The mean overall knowledge score (%) was 36.1%, with a range of 12.1% - 56.9%. The possible score range was 0% – 100%.

The ANOVA test was used in the comparison of the mean knowledge scores (%) for the different shift duties which indicated that the average scores were significantly different. Nurses working night shift had less knowledge about sleep than the day shift or the day/night shift nurses ($F = 9.105$, $p < 0.001$).

Recommendations

Recommendations include further research on nurses' knowledge of sleep in order to inform nursing curricula. Life-long learning is encouraged as are improvements for in-service training, nursing practice, organisational learning and hospital policy.

DEFINITIONS AND EXPLANATION OF TERMS

***Client/client system:** "A total system in interaction with the internal and external environment. A composite of variables (physiological, psychological, sociocultural, developmental and spiritual), each of which is a subpart of all parts, forms the whole of the client. The client as a system is composed of a core or basic structure of survival factors and surrounding protective concentric rings. The concentric rings are composed of similar factors, yet serve varied and different purposes in retention, attainment, or maintenance of system stability and integrity or a combination of these. The client is considered an open system in total interface and exchange of matter and information with the environment. The client is viewed as a system, and the term can be used interchangeably with the client/client system; that is, individual, family, community and social issues are considered a system with boundaries and identifiable interacting parts" (Neuman & Fawcett, 2002: 322).

Complementary and alternative medicine: "Complementary and alternative medicine (CAM) is a broad domain of healing resources that encompasses all health systems, modalities and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. CAM includes all such practices and ideas self-defined by their users as preventing or treating illness or promoting health and well-being. Boundaries within CAM and between the CAM domain and that of the dominant system are not always sharp or fixed" (Zollman & Vickers, 1999: 693).

Critical thinking: A positive activity when questioning assumptions (Quinn, 1995).

Entropy: "A process of energy depletion and disorganisation moving the system toward illness or possible death" (Neuman, 1995: 45).

Environment: "The environment consists of both internal and external forces surrounding man, influencing and being influenced by the client at any point in time (Neuman, 1982: 9). "The created environment is an unconsciously developed protective environment that binds system energy and encompasses both the internal and external client environments" (Neuman, 1995: 45); "it acts as a perceptual safety mechanism to maintain system stability" (Neuman & Fawcett, 2002: 322).

Health: "A continuum of wellness to illness, dynamic in nature, that is constantly subject to change. Optimal wellness or stability indicates that total system needs are being met. A reduced state of wellness is the result of unmet systemic needs. The client is in a dynamic state of either wellness or illness, in varying degrees, at any given point in time" (Neuman, 1995: 46).

Insomnia: "Difficulty initiating sleep, difficulty maintaining sleep, a final awakening that occurs much earlier than desired, or sleep that is non-restorative or generally of poor quality" (Edinger & Means, 2005: 702).

Mean: "A simple descriptive statistic and the one most widely used, is the mean or average. It is obtained by adding together all of the values or scores and dividing this number by the total number of scores" (Seaman, 1987: 344).

Negentropy: "A process of energy conservation that increases organisation and complexity, moving the system toward stability or a higher degree of wellness. Stability and degree of wellness have a direct relationship" (Neuman & Fawcett, 2002: 322).

Nurse: "A person who cares for the sick or infirm; *specifically*: a licensed health-care professional who practices independently or is supervised by a physician, surgeon or dentist and who is skilled in promoting or maintaining health" (Merriam-Webster, 2011).

Nursing: "A unique profession concerned with all variables affecting clients in their environment. Nursing is preventive intervention" (Neuman & Fawcett, 2002: 322).

Orthopnea: "The inability to breathe easily unless one is sitting up or standing erect" (MedicineNet.com http://www.medicinenet.com).

***Patient**: "Person receiving medical treatment" (Ferguson, 1996: 363).

Private hospital: "Means any hospital or any other institution, building or place at which provision is made for the treatment and care of cases requiring medical or surgical treatment and nursing care, but **excluding** –

(a) a hospital or any such institution, building or place conducted by the State, a provincial administration, local authority, private hospital authority, hospital board or any other public body;

(b) any consulting room, surgery or dispensary of a medical practitioner or dentist which does not provide any bed accommodation;

(c) an unattached operating theatre unit;

(d) a hospital or other institution licensed for the reception and detention of mentally ill persons in terms of section 46 of the Mental Health Act, 1973 (Act No, 18 of 1973) and

(e) an institution, building or place for the treatment or nursing care of aged people attached to an old-age home as defined in the Aged Persons Act, 1967 (Act No.81 of 1967), or a housing development scheme as defined in the Housing Development Schemes for Retired Persons Act, 1988 (Act No. 65 of 1988)" (South Africa 1980: 21).

Recovery: "The act of regaining or returning toward a normal or healthy state" (Merriam-Webster, 2011).

Reflexivity: In research "reflexivity is a necessary part of certain processes showing through discussion and debate how project findings either confirm or challenge existing knowledge already published about the knowledge in question" (Watson, Mckenna, Cowman & Keady, 2008: 247).

***** The term 'patient' was changed to 'client' by Neuman in 1980 (Neuman, 2011). The term 'patient' has mainly been used throughout this dissertation and it has been noted that there has been debate in the literature regarding the use of the terms client and/or patient.

Role: "A socially prescribed pattern of behaviour usually determined by an individual's status in society" (Merriam-Webster, 2011).

Sleep: "Sleep is a reversible behavioural state of perceptual disengagement from and unresponsiveness to the environment" (Carskadon & Dement, 2005: 13).

Sleep hygiene: "Refers to the notion that specific kinds of behaviour are conducive to, or are incompatible with sleep and that modifying behaviour may alleviate insomnia" (Perliss, Smith & Pigeon, 2005: 714).

Stress: "A physical, chemical, or emotional factor that causes bodily or mental tension and may be a factor in disease causation". "A state of bodily or mental tension resulting from factors that tend to alter an existent equilibrium" (Merriam-Webster, 2011).

Stressors: "Environmental factors that are intra, inter and extrapersonal in nature and have the potential for disrupting system stability by penetrating the system lines of defence and resistance. Their outcome may be either positive or negative. Client perception and coping ability are major considerations for caregivers and clients" (Neuman & Fawcett, 2002: 322).

ABBREVIATIONS

ANP	"Advanced Nurse Practitioner" (Lee, Landis, Chasens, Dowling, Merritt. Parker *et al*., 2004: 130).
ANS	"Autonomic nervous system" (Rama, Cho & Kushida, 2009: 4).
CCU	"Coronary Care Unit - a hospital unit specially staffed and equipped to treat patients with serious cardiac problems" (Merriam-Webster, 2011: http:/www.merrian-webster.com/medlineplus/coronarycare).
CNS	"Clinical Nurse Specialist" (Lee *et al*., 2004: 130).
CNS	"Central nervous system" (Kryger, Roth & Dement, 2005: xxvii).
COPD	"Chronic obstructive pulmonary disease" (Kryger, Roth & Dement, 2005: xxvii).
CPAP	"Continuous positive airway pressure" (Parker, 2009: 212).
ENP	Enrolled Nurse Practitioner (Lee *et al*., 2004).
HTN	High blood pressure/hypertension (MedlinePlus, 2011)
ICU	"Intensive care unit - thorough supervised treatment of an acutely ill patient in a hospital" (Ferguson, 1996: 284).
MSLT	"Multiple sleep latency test - a validated, objective measure of the ability or tendency to fall asleep under standardised conditions" (Wise, 2009: 64).
NREM	"Non-rapid eye movement" (Kryger, Roth & Dement, 2005: xxviii). "Stadige golf slaap" (Meyer, 1979: 19.4). Nie Vinnige oogbewegings implied (Martin, 1993).
PNP	Primary Nurse Practitioner (Lee *et al*., 2004: 130).
PTSD	"Posttraumatic stress disorder" (Kryger, Roth & Dement, 2005: xxviii).
REM	"Rapid eye movement" (Kryger, Roth & Dement, 2005: xxvii). "Vinnige oogbewegings" (Martin, 1993: 492). "Paradoksale slaap" (Meyer, 1979: 19.4).
SANC	**"**South African Nursing Council" (http://www.sanc.co.za).

NURSING CATEGORY TERMINOLOGY

Nursing categories were in a state of transition from the Nursing Act, 1978 Act No. 50 of 1978 (SANC, 1978) to the new Nursing Act, 2005 Act No. 33 of 2005 (SANC, 2005) when this study (including the questionnaire) was compiled and therefore the definitions as given in both Acts have been included below.

Registered Nurse/Professional Nurse

1a) "**Registered Nurse**: means a person enrolled as a nurse under section 16" (SANC, 1978: 5).

1b) "**Professional Nurse**: means a person registered as such in terms of section 31" (SANC, 2005: 6).

The term registered and professional nurse are often used interchangeably by the nursing profession in South Africa when referring to a nurse who is registered accordingly on the SANC register. To allow for this, the terms 'registered nurse' and 'professional nurse' have been used by the researcher throughout the dissertation.

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CHAPTER 1

Introduction

1.1 Background and need for the study

Sleep is recognised as essential to human life (Rosenthal, 2009; Friese, 2008; Edinger & Means, 2005). Research on sleep has been conducted in a variety of fields. Most of the research applicable to sleep has been conducted on animals (Krueger & Majde, 2009; Guzman-Marin, Suntsova, Bashir, Nienhuis, Szymusiak & McGinty, 2008; Morairty, Hedley, Flores, Martin & Kilduff, 2008; Sun, Yang, Niu, Wang, Peng, Li *et al*., 2006; Suchecki, Tiba & Tuflik, 2002; Everson, 1995) and includes the benefits of adequately consistent sleep cycles, the effects of rapid eye movement (REM) and non-rapid eye movement (NREM) sleep on organ systems and morbidity and mortality relating to sleep deprivation.

Research done on humans suffering from ongoing inadequate sleep has shown that inadequate sleep compromises health and healing (Rosenthal, 2009; Patel, Chipman, Carlin & Shade, 2008; Walsh, Dement & Dinges, 2005; Lee & Stotts, 1990). Inadequate sleep has been shown to result in organ weakness, which with time results in human death (Rosenthal, 2009).

There is evidence which suggests that sleep contributes to both physiological and psychological restoration; therefore it is important that attention should be paid to enabling patients' sleep when they are in a hospital environment (Stepanski, 2009; Patel *et al*., 2008; Friese, 2008; Cmiel, Karr, Gasser, Oliphant & Neveau, 2004; Reid, 2001; Lee & Stotts, 1990; Closs, 1988). Sleep could therefore be a key factor in the prevention of and recovery from illness (Brown, 2009; Dinges, Rogers & Baynard, 2005).

Difficulties associated with sleeping in a hospital environment have been underestimated (Lei, Qiongjing, Qiuli, Sabrina, Xiaojing & Changli, 2009; Friese, 2008; Christensen, 2005; Doğan, Ertekin & Doğan, 2005; Cmiel *et al*., 2004) and nurses play a key role in enabling improved conditions in a hospital setting which are conducive to patients' sleep (Richards, Nagel, Markie, Elwell & Barone, 2003).

Within the field of sleep, patient care and nursing education, there is a paucity of published studies, particularly in the area of nurses' knowledge of sleep and its role in patient recovery. Knowledge of sleep among health professionals who have not undergone a

comprehensive educational programme pertaining to sleep is relatively poor (Sivagnanam, Thirumalaikolundusubramanian, Sugirda, Rajeswarl, Namasivayam & Gitanjali, 2004; Strohl, Haponik, Sateia, Veasy, Chervin & Zee, 2000) and may therefore inhibit effective patient education and potentially lead to less than optimum personal and patient care.

As a Nurse Training and Development Consultant, the researcher finds it pertinent to establish how much nurses know about sleep. The researcher's experience is that nurses' patient care schedules are not organised in a manner which is conducive to patients' sleep. Judging by patient feedback gained by the researcher over years of clinical experience, nurses do not give due consideration to patients' sleep.

1.2 Research aim

The aim of this study was to determine professional nurses' knowledge of sleep and the role of sleep in patient recovery in a private hospital context.

1.3 Objectives

The specific objectives of this study were:

1. To determine what percentage of questions in a questionnaire on sleep was correctly answered by nurses who care for patients who stay overnight. Questions pertained to the following aspects of sleep:
    a. The process of normal human sleep;
    b. The physiological effect of sleep on the human body;
    c. The role of sleep in the maintenance of health;
    d. The risks associated with insufficient sustained sleep and
    e. The role of sleep in patient recovery in a hospital context.
2. To determine nurses' knowledge of sleep-promoting activities/techniques

1.4 Research question

What is professional nurses' knowledge of the role of sleep and its role in patient recovery within a private hospital setting?

1.5 Introduction to the conceptual framework which guided the study

The conceptual framework used to guide the study was that of Dr Betty Neuman. Neuman's systems model describes how stressors can threaten human life if they penetrate the basic energy resource structure (Neuman & Fawcett, 2011). The relationship between the client and the environment is reciprocal: the environment is subject to and can be the cause of stress, producing occurrences which impact on health (Neuman & Fawcett, 2011). One such stressor is disturbed sleep or insomnia, as it negatively impacts on the functioning of the human body (Neuman, 1989). Conversely stress can cause insomnia, which if not alleviated can result in ill health (Rosenthal, 2009; Patel *et al*., 2008; Walsh, Dement & Dinges, 2005; Lee & Stotts, 1990). A fuller explanation of the Neuman Systems Model can be found in Chapter 3 with a diagrammatic representation of the model.

Stress has been identified as negatively influencing sleep patterns which, if not reversed result in declining health (Weissberg, 2009). Peirce and Fulmer present a model based on the Neuman Systems Model, which provides a framework for sleep disturbances in the elderly in Chapter 3 (Peirce & Fulmer, 1995). The sleep disturbances result from stressful changes in environmental, physiological and psychological function (Peirce & Fulmer, 1995). Sleep is one of the core requirements for life and therefore is an important component of any nursing care programme. Knowledge of sleep is important in enabling the nurse to arrange her nursing care interventions and nursing routine and to advise patients on methods to solve or minimise their sleep-related problems.

1.6 Layout of chapters and brief summary of content

Chapter 1 explains the background to and the need for this study, the research aims and objectives, research question, the significance of this study and the conceptual framework used.

Chapter 2 is an overview of the literature pertaining to human sleep and the need for normal sleep. Curriculum issues pertaining to nursing are described and the need for nurses to have knowledge of sleep is discussed.

Chapter 3 presents two models of nursing which have relevance for sleep: the Neuman Systems Model and the application of Peirce and Fulmer's model 'Sleep Disturbance,' which is based on the Neuman health care system. Theories congruent with the Neuman Systems Model are identified.

Chapter 4 describes the research methodology and research design. The population, sample size, sampling, data collection, data management and data analysis are described. Important ethical issues around the conduct of this study are addressed.

Chapter 5 presents the results of the study.

Chapter 6 provides a discussion of the results, outlines the limitations of the study and proposes recommendations based on the results with concluding comments.

1.7 Summary

This chapter provides a background to the study, its aim and objectives and situates the study in context.

CHAPTER 2

Literature review

2.1 Introduction

This chapter provides an overview of normal human sleep and the impact that it has on health and illness. The importance of sleep in nursing curricula and the paucity of literature reporting on nurses' knowledge of sleep and its role in recovery from illness are identified.

A literature search was conducted from 1967 to 2011 using the following key words: sleep; nurse; knowledge; education; hospital; patients; health; health professionals; healing; illness and circadian rhythms. Searches were conducted using the following databases: PubMed Central; Cochrane Collaboration; Science Direct; EBSCOHost; PsycINFO; Academic Search Premier; Africa Wide; CINAHL; MEDLINE; ERIC; Google; Google Scholar; Science News as well as relevant textbooks.

Normal sleep in humans is addressed, followed by the effect of sleep on healing. The relationship between sleep, health and illness is discussed, as is the important role that nurses play as caregivers in promoting health and healing. Insomnia is explained and the cultural significance of sleep is briefly described. Knowledge and education of sleep among health professionals, the role of the South African Nursing Council (SANC) and recommendations for nursing curricula are identified and briefly described. Two studies which offer differing perceptions on the cause of disturbed sleep in hospitilised patients are briefly described.

There has been significant scholarly interest in sleep for over a century, including the discoveries of the electrical activity of the brain, the arousal systems, circadian rhythms and REM sleep (Dement, 2005). However, inclusion of sleep in the curricula of health professionals has been slow and limited.

2.2 Normal human sleep

Sleep is usually associated with a reduction in corporal movement, temporary loss of sight, increasingly diminished reaction to external stimuli and temporary loss of hearing (Rosenthal, 2009; Mathew, 2008; Dement, 2005). The autonomic nervous system (ANS) regulates the crucial functions of internal homeostasis (which includes sleep), and is

composed of the sympathetic nervous system and parasympathetic nervous system (Rama, Cho & Kushida, 2009; Rosenthal, 2009).

Normal human sleep comprises two separate states: NREM and REM sleep which on average occur in regular cycles of 90 minutes in adults and 60 minutes in infants, throughout the sleep period (Rama *et al*., 2009). Sleep in newborns is divided into REM sleep, NREM sleep and indeterminate sleep (Rama *et al*., 2009). NREM sleep is divided into three stages, N1, N2 and N3 and REM sleep is divided into two stages, phasic and tonic (Rama *et al*., 2009). Total loss of muscle tone (atonia) has been shown to occur in humans during the REM stage of sleep, when dreaming often also occurs (Rama *et al*., 2009; Siegel, 2005).

The sleep-wake cycle (circadian rhythm) which occurs approximately every 24 hours, is regulated by the circadian timing system through a complex process linked to light and dark (Rosenthal, 2009; Mathew, 2008; Mistlberger & Rusak, 2005). The suprachiasmatic nucleus in the anterior hypothalamus serves as the central pacemaker of the circadian timing system (Rosenthal, 2009).

The hormone melatonin is secreted by the pineal gland, primarily during the hours of darkness, in all humans and is an important factor in the promotion of sleep. Epidemiological and experimental studies point to differences in sleep duration for healthy adults, influenced by environmental, genetic and societal factors (Dinges *et al*., 2005).

Several models have been used to explain the regulation of sleep and wakefulness. One of these models is the two-process model, which posits that the timing of sleep and waking is dependent on the interaction between process S and process C (Rama *et al*., 2009). Sleep onset occurs when process S and process C intersect (Rama *et al*., 2009). Process S is a homeostatic process that is reliant on the duration of prior sleep and waking (Rama *et al*., 2009). Process C is a circadian process that is independent of the duration of prior sleep and waking: it is under the control of the suprachiasmatic nucleus which determines the sleep and wakefulness cycles (Rama *et al*., 2009; Turek, Dugovic & Laposky, 2005).

Elderly people tend to show reduced total sleep time, take longer to fall asleep, have more night-time awakenings and increased sleepy episodes during the day (Ayalon & Ancoli-Israel, 2009; Ancoli-Israel, 2004). One of the treatments recommended for insomnia is basic sleep hygiene education (Morin, 2005). Sleep hygiene encompasses the following (Morin, 2005: 728):

- "avoid stimulants (e.g. caffeine, nicotine) for several hours before bedtime;
- avoid alcohol around bedtime as it fragments sleep;
- exercise regularly (especially in late afternoon or early evening);
- allow at least a 1-hour period to unwind before bedtime;
- keep the bedroom environment quiet, dark and comfortable and
- maintain a regular sleep schedule".

2.3 Sleep and healing

Sleep is one of the basic requirements for human life and has been shown to impact health and healing (Rosenthal, 2009; Patel *et al*., 2008; Walsh, Dement & Dinges, 2005; Lee & Stotts, 1990).

According to Rosenthal (2009) and Mathew (2008) hypotheses relating to the functions of sleep suggest that:

- during NREM sleep, the body produces human growth hormone for the repair and renewal of epithelial and specialised cells such as brain cells;
- REM sleep is thought to be important for cognitive restoration and
- protein synthesis and cell division for the manufacture and repair of tissues occur during rest and sleep.

2.4 Sleep, health and illness

The relationship between sleep, health and illness is often reciprocal, as chronic interruption of sleep has been shown to result in bodily imbalances (Moul & Buysse, 2009). Illness has been shown to cause sleep disruption (Krueger & Majde, 2009; Kakizaki, Kuriyama, Sone, Ohmori-Matsuda, Hozawa, Nakaya *et al*., 2008; Mathew, 2008; Palmer, 2008; Taylor, 2008; Young, 2008; Dinges *et al*., 2005; Edinger & Means, 2005).

Arendt, Stone and Skene (2005) and Reid and Zee (2005) identify several circadian rhythm disturbances which, if prolonged, could result in illness: blindness; regular jet lag; shift work; lack of darkness; inadequate sleep hygiene conditions and inadequate melatonin production. Monk (2005) and Rosekind (2005) add that long working hours due to shift work, economic demand or personality type can result in insufficient sleep. Further

interruptions of sleep are identified by Nielsen and Zadra (2005) as chronic nightmares, night terrors, dreams, psychopathology and alcoholism.

Wolfson and Lee (2005) present evidence that pregnancy, neonatal care and postpartum recovery can be physically challenging and stressful and often result in sleep dept which if not recovered can result in postpartum depression and/or postpartum psychosis. In comparison to premenopausal women, "50% to 100%" of perimenopausal and postmenopausal women have demonstrated sleep disturbance, which is sometimes associated with hot flashes and night sweats resulting in day time fatigue and mood swings (Moe, 2005: 1287). Postmenopausal occurrences including sleep-disordered breathing, obesity, depression, thyroid disease and cancer have been shown to impact on sleep adversely (Moe, 2005).

Certain physiological aberrations and diseases have been shown to create sleep-wake disturbances, i.e. cerebrovascular accidents (Bassetti, 2005); Alzheimer's disease (Petit, Montplaisir & Boeve, 2005); epilepsy (Shouse & Mahowald, 2005); parkinsonism (Trenkwalder, 2005); neuromuscular diseases (George & Guillerminault, 2005); alcoholism (Gillin, Drummond, Clark & Moore, 2005) and restless legs syndrome (Montplaisir, Allen, Walters & Ferini-Strambi, 2005). Endocrine disorders also cause sleep-wake disturbances i.e. hypothyroidism (Wise, 2009; Moe, 2005) or hyperthyroidism (Grunstein, 2005). Once the disease changes the sleep architecture, in hypothyroidism, mild to moderate increased sleep needs (hypersomnia) occur and in hyperthyroidism, insomnia with excessive daytime sleepiness occurs (Bassetti, 2005).

Pain (Lavigne, McMillan & Zucconi, 2005), headaches, trauma (Culebras, 2005) and artificial respiratory ventilation (Perrin, D'Ambrosio, White, Garpestad & Hill, 2009) have been shown to interfere with normal sleep architecture.

Sleep apnoea has been associated with: renal disease (Parker, 2010); diabetes mellitus (Punjabi & Bearner, 2005); cardiovascular morbidity and mortality (Somers & Javaheri, 2005); sleepiness during waking hours and significant risk of motor vehicle accidents (Stradling & Davies, 2004). However, Lavie and Lavie (2009) have found that in a study of 611 elderly people, moderate sleep apnoea in the elderly has been associated with unexpected survival. In addition, severe apnoea in the elderly did not reflect a higher mortality rate in comparison to the general public.

Drugs prescribed as treatment for an illness can impact on normal wakefulness and sleep cycles (Stepanski, 2009; Mendelson, 2005; Schweitzer, 2005). Nurses therefore need to be aware of the side-effects of medication administered to patients. Nurses should also arrange the administration of insomnia-producing medications in consultation with the medical practitioner, so as to minimise the effect on sleep and thus assist the recovery of the patient. The timeous administration of sleep-inducing medication is equally important.

Research has shown that chronic interruption of sleep can initiate or increase the incidence of the following illnesses: psychiatric disorders (Edinger & Means, 2005); compromised concentration (Edinger & Means, 2005); obesity (Young, 2008; Dinges *et al*., 2005; Van Cauter, 2005); cancer (Kakizaki *et al*., 2008); depression (Taylor, 2008; Edinger & Means, 2005); diabetes mellitus (Van Cauter, 2005; Walsh *et al*., 2005); metabolic syndrome (Javaheri, 2005); cardiovascular disease (Palmer, 2008; Dinges *et al*., 2005; Somers & Javaheri, 2005; Walsh *et al*., 2005) and acute immune response and inflammatory effects (Krueger & Majde, 2009; Dinges *et al*., 2005).

In a systematic review and meta-analysis of 23 studies which investigated the associations between sleep duration and mortality, Gallicchio and Kalesan (2008) conclude that in adults, both short sleepers (less than 7 hours) and long sleepers (more than 9 hours) are at increased risk of all-cause mortality. The limitation of their systematic review and meta-analysis is that their results "must be considered in the context of the inherent limitation of the research pertaining to sleep duration, including the use of a single survey item to assess sleep duration and the lack of consistency in controlling for comorbid conditions" (Gallicchio and Kalesan, 2008: 156).

Mathew (2008) categorises sleep disorders based on the International Classification of Sleep Disorders as listed in Table 1.

Table 1: International classification of sleep disorders as presented by Mathew (2008: http://currentnursing.com/reviews/sleep_nursing_care.htm)

"Dyssomnias:

Intrinsic sleep disorders

- Psycho physiologic insomnia
- Narcolepsy
- Obstructive sleep apnoea syndrome
- Central sleep apnoea syndrome
- Periodic limb movement disorder
- Restless leg syndrome

Extrinsic sleep disorder

- Inadequate sleep hygiene
- Environmental sleep disorder

Circadian rhythm sleep disorder

Parasomnias

Arousal disorders

- Sleep walking
- Sleep terrors

Sleep – wake transition disorders

Parasomnias usually associated with REM sleep

- Nightmares
- Sleep paralysis

Other Parasomnias

- Sleep bruxism
- Sleep enuresis
- Primary snoring

Sleep disorder associated with medical or psychiatric disorders

- Mental disorder
- Neurologic disorders
- Medical disorders"

2.5 Insomnia

Insomnia has been defined as "self-reported difficulty falling asleep, difficulty staying asleep or having nonrestorative sleep, usually in association with daytime impairment" (Stepanski, 2009: 27). Insomnia has been described since the beginning of human history (Dement, 2005) and remains the most common form of sleep medicine-associated problem, yet public and health care providers remain misinformed about the varied types, causes and consequences of insomnia (Dement, 2005; Morin, 2005).

Edinger & Means (2005), Drake, Roehrs, and Roth (2003) and Morin (2005) offer theoretical reviews of insomnia which describe the negative impact, etiological considerations, pharmacological and behavioural treatments for insomnia. Although insomnia is the most common sleep disorder, most insomniacs do not receive adequate advice and treatment (Morin, 2005).

Insomnia is divided into idiopathic insomnia and psycho-physiologic insomnia (Mathew, 2008). Idiopathic (primary) insomnia is a rare disorder characterised by a lifelong history of the inability to obtain adequate sleep and may have a genetic basis (Buysse, Angst, Gamma, Ajdacic, Eich & Rössler, 2005; Mathew, 2008). Primary insomnia does not respond to sleep hygiene practices or the removal of precipitating factors (Mathew, 2008). Psycho-physiological (secondary) insomnia is more common and is usually related to an increased physiologic response to stress (Mathew, 2008). Sleep disturbances may include trouble falling asleep, frequent awakening, waking too early, needing to nap and not feeling rested (Mathew, 2008).

Risk factors for insomnia include premature aging, female gender, living with a psychiatric or medical disorder and pain (Mathew, 2008). The relationship of sleep to illness is often reciprocal, in that the disorder decreases the ability to sleep and decreased sleep may create or worsen the primary disorder (Mathew, 2008). Difficulty in sleeping can be triggered by a variety of occurrences, although when it becomes a chronic problem, psychological and behavioural factors are almost always involved in delaying an improvement (Morin, 2005).

The inadequate treatment of insomnia can lead to a number of important and under-recognised potential consequences, including the development of psychiatric illnesses and medication or illicit drug abuse (Drake *et al*., 2003). If insomnia is severe, expert evaluation is recommended. Morin (2005) suggests that patient education by informed clinical nurses; insomnia treatment information; short one-on-one communication and electronic media are cost-effective ways to enhance treatment access.

Treatment interventions for insomnia encompass "basic sleep hygiene education, psychological and behavioural interventions, pharmacotherapy and a variety of complementary and alternative therapies" (Morin, 2005: 726). Psychological and behavioural options which have been validated in empirical studies are: sleep restriction, stimulus control therapy, relaxation-based practices, cognitive strategies and combined cognitive and behavioural therapies (Morin, 2005).

Research has shown that the amount of sleep required per 24 hours, for restorative functioning differs by a few hours according to individual persons (Mathew, 2008). Six to eight hours of restorative sleep is the average amount of sleep required for an adult person; eight - nine hours for adolescents; nine - ten hours for children attending school; eleven hours for preschoolers; twelve hours for toddlers and sixteen hours for infants (Rosen,

2009; Mathew, 2008). The elderly exhibit a decrease in the total time spent sleeping; take longer to fall asleep; have more awakenings at night and nap more during the day (Ayalon & Ancoli-Israel, 2009).

With the exception of Fatal Familial Insomnia, research exploring the genetic basis of insomnia in humans has been minimal (Buysse *et al*., 2005). In reviewing the literature, morbidity has been shown to significantly increase for insomniacs, although it remains questionable whether insomnia directly results in mortality risk (Buysse *et al*., 2005). However, chronic sleep deprivation in rats over a two to three week period has resulted in death (Rosenthal, 2009).

2.6 The cultural significance of sleep

Eugene (2006) in her thesis titled *Potent sleep: The cultural politics of sleep* is critical of the fact that there is limited researched evidence in literary form, of the nature of sleep in cultural studies and in many faculties. "The very people who collectively invest several generations of time and energy into elucidating the banal and exciting, the micro and macro, the semiotic and material, the historical and futuristic aspects of human life have not taken sleep into consideration, leaving one third of the average person's lifetime eerily absent from the omnipresent eyes and ears of academia" (Eugene, 2006: 10).

Considering that all hospitals in South Africa accommodate people from all cultures, it is important for nurses to understand their role in transcultural nursing in all situations and especially when nursing patients with sleep disruptions (Kalayjian, Marrone & Vance, 2010). Although sleep is documented on most basic needs assessment forms, no evidence has been found which requires a sleep preference history to be taken on admission to non-psychiatric hospitals.

In contrast to sleep hygiene recommendations made for Western societies, Eugene (2006) and Bower (1999) observe that anthropologists are making some progress in elucidating the cultural significance of sleep in traditional societies. It may be common in some cultures for people to sleep on a hard surface, in close proximity to one another, with accompanying intermittent background noise emanating from the other sleepers, domestic animals, fires maintained for warmth and protection and close neighbour night-time actions (Bower, 1999). The ideal of privacy and serenity for the Western sleeper seems to suggest social norms and values rather than being a human need for sleep (Eugene, 2006).

2.7 Knowledge and education of sleep among health professionals

The major barrier to the improvement of sleep knowledge and the availability thereof "is the failure of sleep research and sleep medicine to effectively penetrate the educational system at any level" (Dement, 2005: 11). Consequently, "most people remain uninformed of important facts relating to sleep and wakefulness, the fundamentals of biologic rhythms, sleep disorders and particularly of the symptoms that suggest a serious pathologic process" (Dement, 2005: 11). It is acknowledged that the education and training of all health professionals, including nurses, regarding sleep and sleep disorders requires substantial improvement (McIntosh & MacMillan, 2009; Palmer, 2008; Dement, 2005; Lee *et al*., 2004; Crisostomo, Merritt, Roe, Foley & Basner, 1999).

Knowledge of sleep among health professionals who have not undergone a comprehensive educational programme pertaining to sleep, is relatively poor and may therefore prevent effective patient education and potentially less than optimum personal and patient care (Sivagnanam *et al*., 2004).

In order to be able to accurately draw up and implement a care plan related to sleep disturbances the nurse and carer need to have insight into the importance of undisturbed sleep, sleep hygiene and the causes and sequela of disrupted sleep. In relating sleep theory to practice, Hodgson (1991: 1509) advises nurses and carers to draw up an individualised patient care plan specifying the following aspects:

- "age;
- the normal pattern of sleep during health;
- current pattern of sleep;
- nurtritional status;
- emotional status, e.g. anxiety, depression;
- daytime and night-time symptoms, e.g. pain, dyspnoea;
- sleeping environment;
- sleep-related rituals, e.g. bedtime drinks, reading, television;
- presence of dreams or nightmares;
- present medication and
- wake-time behaviour,. e.g. naps, mental efficiency".

The nurse and carer must implement the care plan and monitor the results, with further adaptation as required. Hodgson (1991) further recommends that the health and sleep pattern of the patient and the carer must be addressed in order to benefit the patient.

2.8 Nursing curriculum content regulation in the South African setting

All nurses have a professional obligation regarding the safety of patients and they are required to apply a duty of care (SANC, 1985a). The SANC is the regulatory body for the scope of practice for the nursing and midwifery professions (SANC, 1984), whose vision is to "regulate the nursing and midwifery professions to ensure safe and quality practice" (SANC, 2008a). The mission of the SANC is "to protect the public by setting education, practice and research standards; collaborate with relevant partners for holistic health care; monitor nursing and midwifery practice based on set criteria; formulate and ensure the implementation of nursing and midwifery legislation and policies in response to societal needs" (SANC, 2008b). The inclusion or exclusion of information relating to sleep in the nursing curricula is therefore strongly influenced by the educational standards set by the SANC.

2.9 Learning objectives pertaining to sleep in nurse education

Lee *et al*. (2004) have developed a conceptual framework for understanding sleep and circadian rhythms that can be used to organise curriculum content for nursing students, nurse educators, researchers, practicing nurses and advanced practitioners. They include learning objectives for undergraduate and graduate level students, clinical competencies, suggested reading and lecture slides (Lee *et al*., 2004).

The conceptual model was developed following discussion among sleep study nursing experts and surveys of the content in nursing textbooks in order to develop sleep and chronobiology curricula for nurses. The resulting information was submitted "for comment to the Curriculum Committee of the Sleep Medicine Academic Award Programme" (Lee *et al*., 2004: 126). A portion of the final consensus pertaining to sleep education and relating to the objectives for undergraduate nursing curricula is presented in Table 2 and for graduate nursing curricula in Table 3 (Lee *et al*., 2004: 127). They found that there were no functional curricula "for sleep or chronobiology in undergraduate or graduate nursing education" (Lee *et al*., 2004: 126). Lee *et al*. (2004: 126) justify the need for the development of their framework by explaining that "the discipline of nursing is concerned with human responses in illness and wellness at individual, family and

community levels of practice". Studies evaluating the effectiveness of their recommended curricula have not been found.

Table 2. Undergraduate objectives and suggested medical-surgical-clinical nursing experiences as recommended by Lee *et al*. (2004: 128)

"Learning objectives

1. Describe normal developmental changes in sleep across the lifespan.
2. Identify normal and abnormal sleep patterns.
3. Describe commonly occurring primary sleep disorders and associated symptoms including excessive daytime sleepiness and abnormal nocturnal behaviours, sensations or movements.
4. Integrate knowledge of sleep into health assessment across populations and clinical settings.
5. Provide and evaluate environmental and behavioural nursing interventions to promote effective sleep patterns.
6. Collaborate in the delivery of pharmacological and non-pharmacological sleep interventions.
7. Incorporate patient teaching strategies for sleep promotion and sleep hygiene into nursing care.

Suggested medical-surgical clinical experiences

1. Up to 24 hrs in Accredited Sleep Disorders Centre.

a) 4-8 hrs during the day (patient history and physical assessment for sleep disordered breathing or excessive daytime sleepiness, observation of MSLT);
b) 4-8 hrs during the evening (patient preparation for polysomnography sleep study);
c) 4-8 hrs during the night (observing polysomnography recordings for physiological evidence of fragmented sleep).

2. 2 to 8 hours on night shift observing interruptions in sleep in ICU or CCU unit.
3. 2 to 8 hrs on any shift observing interrupted sleep or daytime sleep in nursing home patients.

Suggested medical-surgical clinical competency objectives

1. Conduct a patient history using the BEARS {B (bedtime), E (excessive daytime sleepiness), A (awakenings), R (regularity) and S (snoring)} for a patient with chief complaint of daytime sleepiness.
2. Monitor sleep by objective measures (polysomnography or actigraphy) or observational measures (observation, videotape).
3. Describe nursing implications of medical (appliances, medications) and surgical treatment options for obstructive sleep apnoea syndrome.
4. Identify patients at risk for physical health problems, including accidents and injuries due to excessive daytime sleepiness.
5. Identify factors that influence adherence to treatment for insomnia, sleep apnea syndrome, narcolepsy, or restless legs syndrome.

Clinical evaluation possibilities for medical-surgical nursing

1) Develop nursing care plan for a patient who has just been prescribed nasal CPAP for obstructive sleep apnoea syndrome.
2) Develop nursing care plan for a patient who has just been diagnosed with narcolepsy or restless legs syndrome.
3) Calculate sleep efficiency (number of minutes of sleep during the time in bed trying to sleep) for a group of five patients in a given clinical setting such as ICU, CCU or nursing home.
4) Write a paper (5-10 pages) on the effects of patient's insomnia or excessive daytime sleepiness on the family or effects on daytime work performance or activities of daily living" (Lee *et al*., 2004: 128).

In order to promote education, training and research which could improve the sleep and well-being of children and adults, Lee *et al*. (2004) compiled learning objectives and clinical experiences for graduate nurses (Table 3).

Table 3. Graduate learning objectives and clinical experiences for advanced practice students (Lee *et al*., 2004: 130)

"Objectives for clinical nurse speciialist (CNS) role

1. Identifies potential abnormal sleep patterns in a specific patient population.
2. Recognizes commonly occurring causes of sleep loss in a patient population.
3. Provides and evaluates environmental and behavioural nursing interventions to promote effective sleep patterns in a specific patient population.
4. Implements safe and effective delivery of pharmacological and non-pharmacological sleep interventions to a patient population.
5. Develops and implements patient teaching strategies for sleep promotion into nursing care for a specific patient population.
6. Develops and implements nursing staff protocols to assure sleep promotion in your nursing care practice.

   Clinical experiences: 10 weeks in an Accredited Sleep Disorders Centre

   a) 4-5 weeks during the day (patient history and physical assessment for sleep disordered breathing or excessive daytime sleepiness; observation of MSLT)
   b) 2-3 weeks during the evening (patient preparation for polysomnography sleep study)
   c) 2-3 weeks during the night (observing polysomnography for physiological evidence of fragmented sleep)".

Objectives for primary care roles (ENP, ANP or PNP)

1. Performs thorough history and physical examination on patients with insomnia, excessive daytime sleepiness or abnormal nocturnal behaviours, movements or sensations.
2. Incorporates the use of basic sleep assessment tools (e.g. sleep diary) into assessment.
3. Identifies clients at high risk for sleep disorders.
4. Considers common sleep disorders in differential diagnosis.
5. Manages uncomplicated insomnia.
6. Refers clients with suspected or known sleep disorders to sleep specialists as appropriate.

   Clinical experiences: 5 weeks in an Accredited Sleep Disorders Centre

   a) 2-3 weeks during the day (patient history and physical assessment for sleep disordered breathing or excessive daytime sleepiness; observation of MSLT)
   b) 1-2 weeks during the evening (patient preparation for polysomnography sleep study)
   c) 1-2 weeks during the night (observing polysomnography for physiological evidence of fragmented sleep)" (Lee *et al*., 2004: 130)

Sleep and circadian rhythms are biological processes that can influence health or conversely, sleep can be influenced by illness and unfavourable environments (Lee *et al*., 2004: 126). A model of impaired sleep presented by Lee *et al*., (2004: 127) is shown in Figure 1: this model serves to guide nurses in identifying sleep-related problems and the potential consequences of impaired sleep.

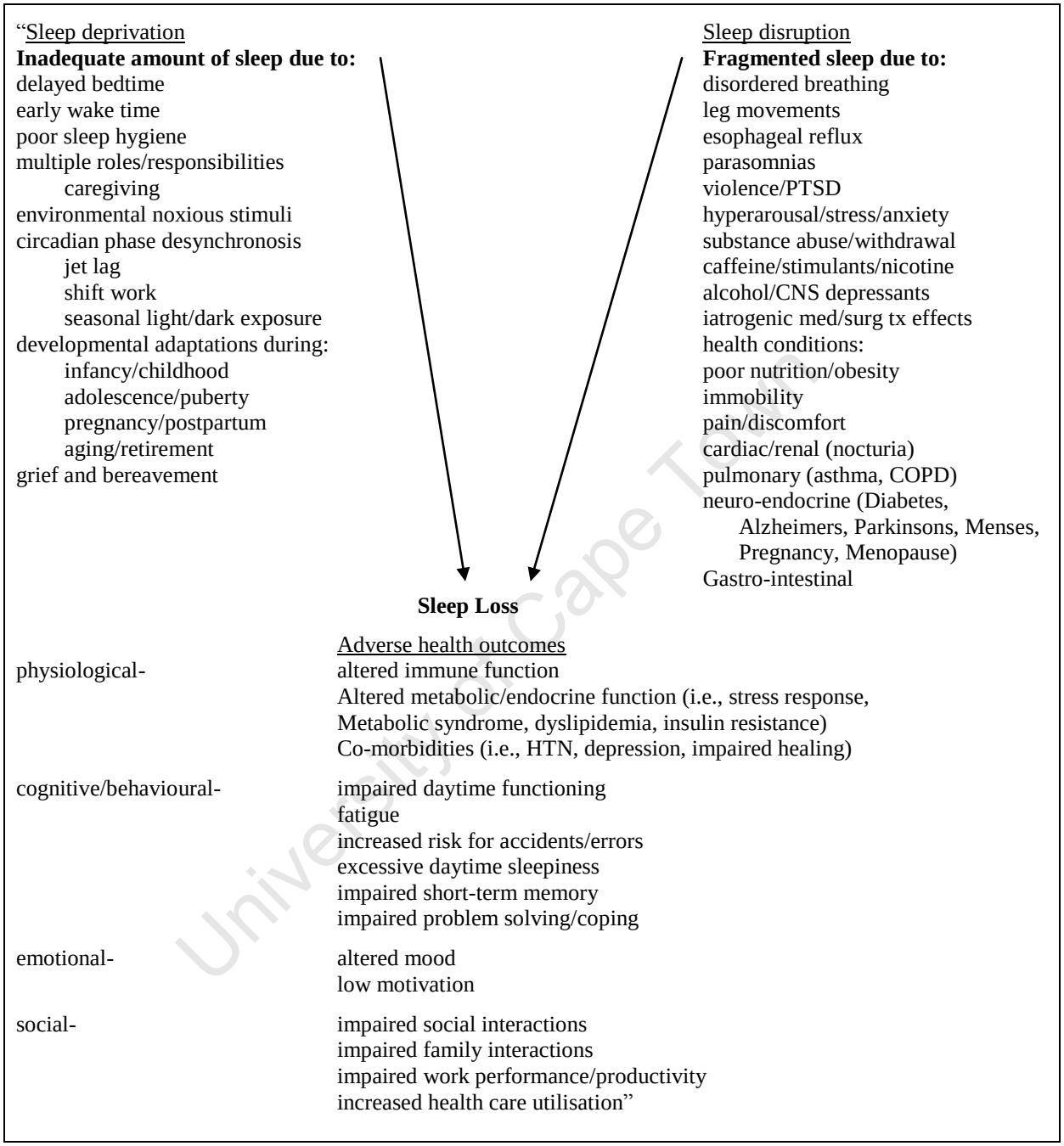


Figure 1: Conceptual model of impaired sleep (Lee *et al*., 2004: 127).

2.10 Perceptions of sleep-disturbing factors

Two studies applicable to patients' sleep in a hospital environment will be described in brief. These were selected since they present different explanations for patients' disturbed sleep in a hospital environment. The first study (Lei *et al*., 2009) refers to the differences between patients' and nurses' perceptions regarding sleep disturbances in a medical and surgical ward context. The second study (Aurell & Elmqvist, 1985) tests a hypothesis regarding patients' physiological inability to obtain adequate sleep postoperatively in a quiet surgical intensive care unit.

Lei *et al*., (2009) conducted a medium-sized survey of 397 inpatients and 101 nurses in the largest university-based teaching general hospital in China. The survey aimed to determine sleep quality and factors that disturb the sleep of inpatients and was undertaken from July to September 2006. They also compared the perception of sleep-disturbing factors between nurses and inpatients. Medical wards and the patients in each ward were selected using a random number table (Lei *et al*., 2009). All the nurses on night duty responsible for patients who participated were included in the study and only informed of their inclusion after they had nursed the patients and after distribution of the questionnaires. This was done to ensure that the nurses did not modify their behaviour as a result of knowing that they were included in the nurses' group. Inclusion and exclusion criteria were strictly adhered to: patients were excluded if they were unconscious or suffered from extreme pain. All participants were required to sign consent forms. The Pittsburgh Sleep Quality Index and self-designed questionnaires were used. The questionnaires were modified and evaluated by experts and were utilised to examine inpatients' sleep quality and to compare perceptions of sleep-disturbing factors (Lei *et al*., 2009).

Data were analysed using the "statistical package for the Social Sciences (SPSS 11.0), the Chi-square test and a logistical regression analysis" (Lei *et al*., 2009: 2523). "The Z statistic was used to compare the differences in perceptions of the inpatients group versus the nurses group; $p < 0.05$ was considered to be statistically significant" (Lei *et al*., 2009: 2523). Poor sleep quality was reported by 45.6% of the patients during their hospital stay (Lei *et al*., 2009). Differences in the perceptions in nurses and inpatients persisted across nine of the fourteen recorded disturbance factors with statistical significance ($p < 0.05$) (Lei *et al*., 2009). Main sleep-disturbing factors reported by the inpatients were: emotional factors (anxiety, boredom, missing relatives and loss of independence); pathophysiological

factors (discomfort associated with the disease, the process of receiving medication, toilet use) and environmental factors (nurses attending to patients, nursing at night, ringing telephones, noise from the air-conditioner, nurses talking, noise from nurses shoes and noise emanating from treatment machines) (Lei *et al*., 2009). Nurses' perceptions of the main sleep-disturbing factors affecting the inpatients were significantly different to those reported by the inpatients. The nurses ranked the following sleep disturbing factors higher than the inpatients "nursing at night" and "noise from treatment equipment" and the following sleep disturbing factors lower "boredom", "using toilet", "nurses attending to patients", "missing relatives", "telephones ringing", "noise from air-conditioners", "not being in control of oneself", "nurses talking to each other" and "noise from nurses' shoes" (Lei et al., 2009: 2526). The greatest differences in ranking order between the inpatients versus the nurses, was "missing relatives"; "not being in control of oneself" and "nursing at night" as a sleep-disturbing factor (Lei *et al*., 2009: 2526).

The study indicated that the majority of inpatients reported sleeping problems stemming from many sources. Most nurses were aware that inpatients sleep poorly at night, however, most patients continued to experience the ongoing disturbing factors which limited their sleep. Therefore, education pertaining to sleep and "behaviour modification programs" are needed for nurses in order to minimise the sleep-disturbing factors (Lei *et al*., 2009: 2526).

Limitations of this study are that the results are not generalisable due to the limited geographical area related to a single hospital in China. In addition, several factors were not taken into consideration, e.g. the effects of disease symptoms, dose and usage of pain-alleviating medication, severity and type of illness and duration of hospital stay (Lei *et al*., 2009).

The second study, by Aurell & Elmqvist (1985), was a limited study which aimed to measure the amount of postoperative sleep that was obtained in nine patients in an intensive care unit for two to four days after major non-cardiac surgery. Their hypothesis, which was supported by other studies, was that postoperatively "the gross abnormality of the sleep pattern suggests that the inability to sleep may be the result of some fundamental disorder of the sleep-wake regulating mechanism" (Aurell & Elmqvist, 1985: 1032).

All inclusion criteria were met and exclusion criteria were any psychiatric tendencies; dependence on pharmacological medication; central nervous system anomalies or unusual

sleeping tendencies latterly. Informed consent was obtained from all participants. Various continuous "poly-graphic recordings" were carried out to measure evidence of sleep in the brain (Aurell & Elmqvist, 1985: 1029). Presumed optimal conditions for sleep were provided through the concerted effort of all staff, who ensured consistent pain relief and minimal environmental disturbances. The same "anaesthetic agents" were used for those requiring general anaesthesia (Aurell & Elmqvist, 1985: 1029). Analgesia were administered postoperatively via "epidural analgesia (local anaesthetics), epidural morphine, intravenous opiates and on a few occasions coeliac ganglion and intercostal blocks" (Aurell & Elmqvist, 1985: 1030). Sedatives and hypnotics were not refused. Administration of care was clustered and was restricted to twice per night: at 23h00 and 03h00 (Aurell & Elmqvist, 1985). The researchers admit that of the drugs administered, only morphine is known to profoundly interfere with normal sleep architecture.

Each patient was nursed in a single-bed isolation room by trained staff. When apparently asleep, the patients were not awakened unnecessarily and nursing procedures were postponed. Several patients awoke intermittently for no apparent reason. Two patients remained intubated on artificial ventilation following the surgery and remained in the Intensive Care Unit for four nights or more. The others returned to the ward on the second or third day.

When interviewed the patients reported "only moderate sleep disturbance before the operation" (Aurell & Elmqvist, 1985: 1032). The "Paired *t* test (two tailed) was used for statistical analysis of the polygraphic recordings versus the clinical observations" (Aurell & Elmqvist, 1985: 1030). In six patients, the clinical observations parallel with polygraphic recordings of sleep time per sleep period, revealed a statistical significance of $p<0.001$ (Aurell & Elmqvist, 1985: 1030). The conclusion reached was that the patients experienced extremely limited sleep postoperatively, regardless of every effort made to maintain optimal pain control and to minimise all possible disturbances.

Aurell & Elmqvist (1985: 1032) suggest that the cause of the gross abnormality of the sleep patterns "is the result of some fundamental disarrangement of the sleep-wake regulating system". This hypothesis was "supported by the observation, that even when sleep was uninterrupted long enough to allow a full sleep cycle, stage 3, 4 and REM sleep often did not occur" (Aurell & Elmqvist, 1985: 1032). Furthermore, they reported that sleep time was totally overestimated by human observation.

The limitation of the study is that the results are not generalisable due to the small number of participants: however, the researchers argue "that the results are based on continuous polygraphic recording with the subsequent visual interpretation of some 64000 half minute epochs" (Aurell & Elmqvist, 1985: 1032).

2.11 Summary

This literature review on sleep and the importance of knowledge about sleep among health professionals and nurses reveals that limited research has been done into the extent of sleep as a curriculum topic within nursing education. Sleep disturbance is caused by a variety of factors - environmental, psychological, emotional, developmental and physiological. Nurses' and patients' perceptions of the causes of sleep disturbance differ. A hypothesis of post-operative insomnia suggests that a fundamental disturbance of the sleep/wake-regulating mechanism occurs, which contrasts with patients' and nurses' perceptions of insomnia in an intensive care and hospital ward environment.

Given that sleep is acknowledged as an important factor in patient recovery, the current study provides further understanding of the importance of nurses' knowledge of sleep and its role in patient recovery.

CHAPTER 3

Models and theories of nursing which have relevance for sleep

3.1 Introduction

Development of theories applicable to nursing was driven by nurse leaders, who acknowledged that a defined body of knowledge was required in order to establish nursing as a profession (Chinn & Kramer, 1999; Akinsanya, 1989; Walker & Avant, 1983). The structuring of a body of knowledge for nurses would make it systematically applicable and useful as a framework for nurses in obtaining, interpreting, planning, implementing and evaluating the care given in nursing (Chinn & Jacobs, 1987; Walker & Avant, 1983; Neuman, 1982).

3.2 History and background to the theorist Betty Neuman and the Neuman Systems Model

Betty Neuman was born in 1924 in Ohio, United States of America. She has a mental health background in nursing and a Ph.D in Clinical Psychology. Neuman developed the Neuman Systems Model in 1970, primarily strictly as a teaching aid (Neuman, 2011). Use of the model proved beneficial for student education and after a two-year trial period, the model was first published in 1972 (Neuman, 2011). The Neuman model has been adapted intermittently since first published: latest developments include the created environment, which incorporates the spiritual aspect and the option of long-distance or Internet communication between client and nurse (Neuman, 2011). The Neuman Systems Model provides structure for education, practice and research and examples of these are increasingly evident in her text books (Gigliotti, 2011).

The Neuman Systems Model is abstract, unique and wholistic and provides an all-encompassing framework which aids health professionals, including nurses, in their approach to a wide range of clients' actual or potential health-related concerns (Neuman, 2011). Extensive application of the Neuman Systems Model is evident in various health care, educational and research settings (Beckman, Lowry & Boxley-Harges, 2011; Cammuso, Silveri & Remijan, 2011; Groesbeck, 2011; McDowell, 2011; Freiburger, 2011; Kinder, Napier, Rubertino, Surace & Burkholder; 2011; Shambaugh, Neuman & Fawcett, 2011; Burns, 2011; Peirce & Fulmer, 1995; Haggart, 1993; Moore & Munro, 1990; Hinds, 1990; Knight, 1990).

The theoretical underpinning of the Neuman Systems Model is based on various theories including Systems theory, Gestalt theory and Adaptation theory. This presents a wholistic approach to a problem which causes disequilibrium in health (Seaman, 1987; Neuman, 1982). The Neuman Systems Model has been used as a context for deriving and testing middle-range theories and five steps have been identified to achieve this (Gigliotti, 2011). The five step process entails: understanding the Neuman Systems Model; reviewing published Neuman Systems Model-based research; compiling a "conceptual-theoretical-empirical structure (C-T-E)"; clarifying the structure and evaluating the academic relevance "of the middle-range theory and the legitimacy of the Neuman Systems Model" (Gigliotti, 2011: 283).

3.3 Theories compatible with the Neuman Systems Model

A major theory for the Neuman Systems Model was identified by Neuman and a colleague Audrey Koertvelyessy: "the theory of client system stability" (Neuman, 2011: 335). The theory emphasises that wholistic balance equates to health (Neuman, 2011). Additional theories which could be applied to the Neuman Systems Model and this study on nurses' knowledge of sleep and its role in patient recovery include: comfort theory and practice by Katharine Kolcaba (2003) and Leininger's theory of culture care diversity and universality in Nursing Practice (Morgan, 2006). Both the aforementioned theories are compatible with Neuman's model in that they have: "shared assumptions; cultural applicability; disciplinary boundaries; nursing education; focus of care; process or product distinction; shared values and scientific orientation" (Kolcaba & Kolcaba, 2011: 302). All the above-mentioned theories are applicable to humans, the continuum between health and illness, the art and science of nursing, empathy and wholistic care, socioculture and the influence of the environment on health and dying.

Kolcaba's theory pertains to human care and nursing and evidence of it being juxtaposed with the Neuman Systems Model is presented by Kolcaba in Neuman's 2011 textbook (Kolcaba, & Kolcaba, 2011). Leininger's theory addresses human caring and transcultural nursing, which is a proponent of the discovery and establishment of culturally sensitive care for people in health and illness (Morgan, 2006). Leininger identifies "generic care", which alludes to the importance of nurses' knowledge of folk and traditional medicine in the care of the patient (Morgan, 2006). A variety of ethnic groups are admitted to both private and general hospitals in South Africa and hence the theory on transcultural nursing is applicable to this study. Many sub-Saharan Africans of tribal origin often use

unresearched treatments, which are often ineffective or harmful (Kale, 1995). These treatments or medications are acquired from traditional healers long before westernised treatments are resorted to (Liddell, Barrett & Bydawell, 2004; Kale, 1995).

The primary nursing goal when applying the Neuman Systems Model to patient care is to enable health in a wholistic way (Neuman, 2011). Every component, concept and variable of the Neuman Systems Model acts synergistically in achieving, maintaining and retaining health (Neuman, 2011). It is the nurse's responsibility to assist the patient to strengthen defence mechanisms in order to reduce stressors which threaten optimum health (Neuman, 2011).

The concepts and variables of the Neuman Systems Model are listed below (Gigliotti, 2011: 284).

- "Client system

  Individual; family; community; social issue.
- Interacting variables

  Physiological; psychological; sociocultural; developmental; spiritual.
- Stressors

  Intrapersonal; interpersonal; extrapersonal.
- Basic structure or central core.
- Lines of defence

  Flexible line of defence; normal line of defence; lines of resistance.
- Environment

  Internal environment; external environment; created environment.
- Optimal client system stability.
- Variances from wellness.
- Reconstitution.
- Prevention as intervention

  Primary; secondary; tertiary".

3.4 Five main concepts pertaining to the Neuman Systems Model

The five main concepts pertaining to the Neuman Systems Model are described, and a diagrammatic structure of the model is presented.

3.4.1 Client/client system

Neuman (1989: 57) explained that the term "client/client system" incorporates the individual human being ("man or person") as an "open system" which has protective layers of defence, and needs core requirements to exist and that every individual differs in response to stressors. The client system could be interpreted as a group of people, the family of that person or the community (Haggart, 1993; Neuman, 1989).

The variables pertaining to the client/client system can be interpreted as physiological, which refers to the physiological and chemical composition of the human body; psychological, which refers to the psychology, mental and emotional aspects of man; sociocultural, which refers to the social interaction of man and accompanying habits, beliefs and values; developmental, which refers to progress towards reaching full potential and with advanced age the declining ability of the human body and mind and spiritual which refers to an innate, conscious or unconscious acknowledgement or denial of the profound influence that the spirit has on health (Neuman, 1989).

3.4.2 Environment

The environment has been identified as the "internal environment, external environment and created environment" within man (Neuman & Fawcett, 2002: 31). The environment is multifactorial and applies to internal (intrapersonal), external (inter- and extrapersonal) and unconsciously developed components of the human body (created environment) (Neuman & Fawcett, 2002). The created environment is based on imaginary, subconscious knowledge such as ego, perceived danger and personality tendencies (Neuman, 1989) and acts as a perceptual safety mechanism to ensure system stability (Neuman, 2011). The created environment is influenced by internal and external influences (intra-, inter- and extrapersonal factors). "The client and environment exist in a reciprocal relationship" (Neuman & Fawcett, 2002: 31). Environmental stressors can be beneficial or detrimental to man and it is acknowledged that fluctuations in the environmental system will result in "varying reactions at any given point in time" (Neuman & Fawcett, 2002: 31).

3.4.3 Health and wellness

Man is either in a state of health "negentropy" when all system needs are met, or "entropy", when system needs have not been met due to invading stressors (Neuman & Fawcett, 2002: 11). Health fluctuates in relation to the human body's ability to defend itself against stressors. "Health is dependent on energy which flows between the environment and the client system and is greatly affected by environmental stressors" (Neuman & Fawcett, 2002: 33).

3.4.4 Nursing

Central to nursing is retaining, attaining, and maintaining client system stability. This is achieved through accurate ongoing assessment of the client and invading stressors: furthermore this could assist the client to develop trust in and cooperation with the link between client, the environment, health and the nurse (Neuman, 1989). The process further requires the nurse to assist the client to make lifestyle adjustments appropriately in order to maintain optimum wellness (Neuman & Fawcett, 2002).

Neuman (1989) equates wellness to wholeness and explains that wholistic care encompasses caring for the mind, body and spirit of the client via a mutually agreed process.

3.4.5 Prevention as intervention

It is widely documented that nurses are required to use primary, secondary and tertiary prevention strategies accurately and timeously in consultation with the health care team in order to promote optimum health. Intervention can be implemented when a stressor is either suspected or identified and each stage of the prevention intervention process can be used in isolation or synergistically (Neuman, 1989). The prevention intervention stages rotate in a circular fashion in order to negate further stressors (Neuman, 1989). The circles of defence surrounding the basic structure of energy resources in the Neuman Systems Model (Figure 2) expand and contract according to the threat of invasion by the stressors. Neuman (1989) explains that in circumstances where malnutrition, inadequate sleep or grossly reduced fluid intake occurs, the circles of defence become increasingly unstable and disease symptoms present in the client.

Primary prevention intervention is recommended by Neuman (1989) to encourage client wellness through education and to identify and reduce risk factors.

Secondary prevention intervention is necessary when primary intervention was not implemented or was unsuccessful and a reaction detrimental to health occurred (Neuman, 1989). Treatment of symptoms will be required in order to assist the flow of energy to promote wellness (Neuman, 1989).

"Tertiary prevention intervention is rehabilitation of the client" (Neuman, 1989: 37). The goal-setting process must be mutually agreed upon between client and nurse or caregiver (Neuman, 1989). Client and community resources may need to be sourced and utilised for this purpose (Neuman, 1989).

A brief description of the interrelated concepts of the Neuman Systems Model is presented below (Gigliotti, 2011).

- The client is a system capable of receiving and giving energy and information related to intra, inter and extrapersonal environmental influences, through personal flexibility, interaction or adjusting the environment to itself.
- Acceptance, sharing and communication between the client and the environment is of a reciprocal nature, the result of which is remedial.
- Many identifiable, unidentifiable and worldwide environmental stressors exist: each different in its potential for distrupting a client's usual equilibrium or normal line of defence. Specific interrelationships of client variables (physiological, psychological, sociocultural, developmental and spiritual) can alter the degree to which a client is protected by the flexible line of defence against the effects of one or more stressors.
- The stressor breaks through the normal line of defence when the flexibility of the normal line of defence is inadequate to deal with the stressor. The interrelationship of variables (physiological, psychological, sociocultural, developmental and spiritual) establishes the type and amount of the system response or possible reponse to the stressor. Internal and external helpful sources are activated to mimimise harmful potential or actual stressor reactions.
- The client is an open system interacting fully with internal and external environmental pressures or stressors. Furthermore, the client is in flux with interchanging environmental interactions and this results in either various degrees of harmony or wellness or of instability or sickness.

- The process of interaction and adjustment results in varying degrees of accord, constancy or equilibrium between client and the environment. Ideally, there is optimal, consistent client system stability and harmony.
- Nursing aims to enable client harmony and stability through accurate application of knowledge, both in assessing the consequences and potential effects of environmental stressors and in assisting clients to achieve or maintain health.
- The nurse's function is to enable equilibrium and harmony between the client, environment, health and nursing.

Neuman (1989) identified a deficit in nursing methodology, which explicitly prevented nurses from developing a nursing diagnosis systematically within the nursing process. The three categories that she recommends be used as part of the nursing process are: "nursing diagnosis, nursing goals and nursing outcomes" (Neuman, 1989: 40).

In order to rectify identified deficits in nursing practice, Neuman (1982) devised an assessment intervention tool, a prevention as intervention format and three categories for the scientific nursing process specific to her systems model.

Neuman herself does not specify sleep as a core component in her model per se. Neuman does however refer to inadequate sleep as one of the factors that can invade the lines of defence, causing disequilibrium in the health of man (Neuman, 1989). The Neuman Systems Model is considered further in discussion of the results of the study.

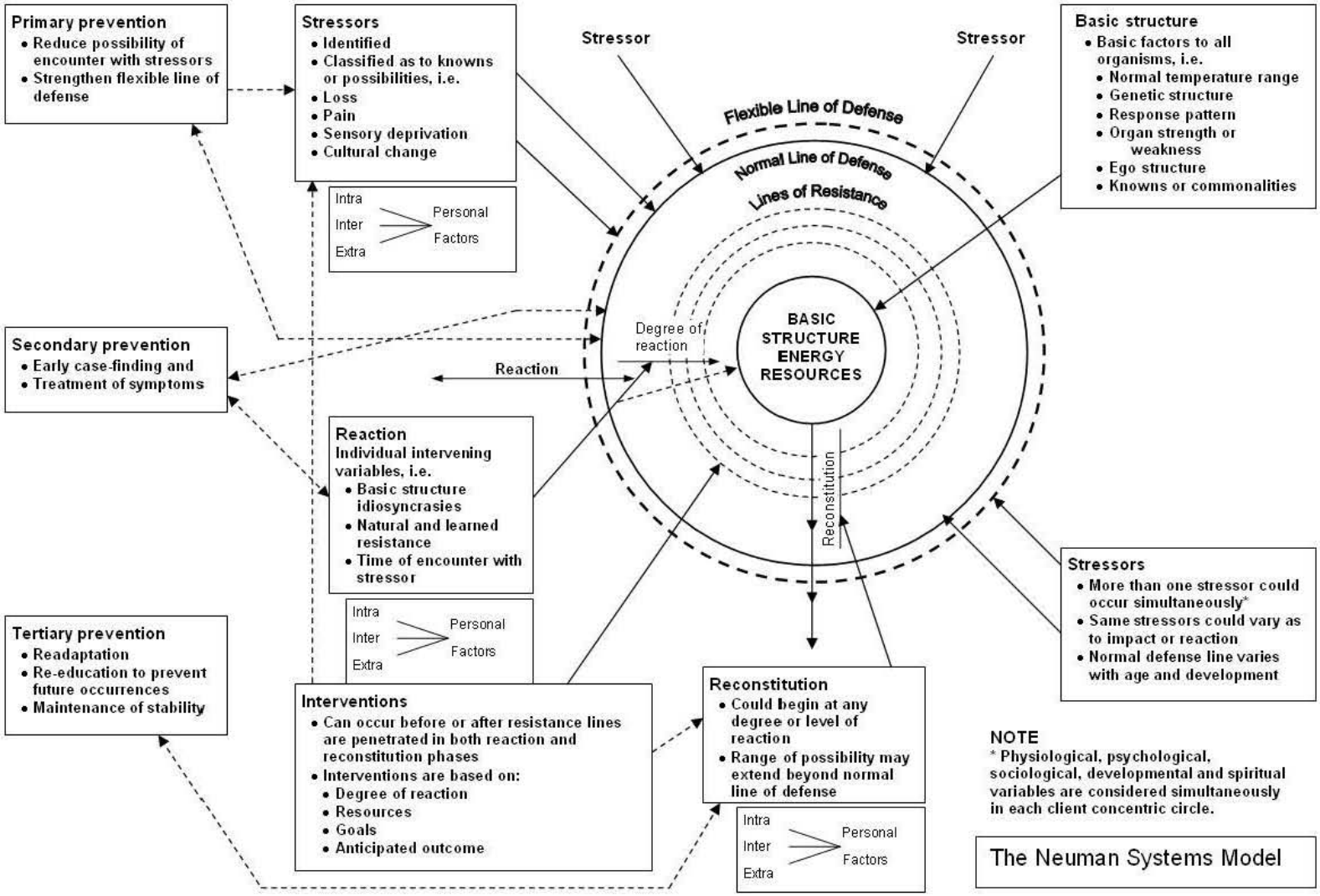


Figure 2: The Neuman Systems Model (Neuman, 1995: 17)

3.5 Application of Peirce and Fulmer's Model Sleep Disturbance, based on the Neuman health care system

The single variable which will be addressed in this dissertation in relation to Peirce and Fulmer's analysis of gerontological nursing is sleep disturbance. Gerontological nursing is the study of the progression of ageing and the care that the elderly require (Peirce & Fulmer, 1995). The gerontological client can be conceptualised as "an individual, client or community" (Peirce & Fulmer, 1995: 304). The problem of sleep disturbance in the elderly was applied by Peirce and Fulmer (1995: 304) in their model, Sleep Disturbance (Figure 3), which was based on the Neuman Systems Model. Peirce and Fulmer's model was selected as it can be used to guide nurses in the understanding of sleep disturbances particularly in the elderly and in the planning of effective sleep-promoting interventions. Peirce and Fulmer (1995) have identified several physiological variables in gerontology and have applied Neuman's model to the nursing care of the elderly in acute and home care settings.

"The Neuman Systems Model provides the needed flexibility, allowing the nurse to conceptualise elders within an organisational framework, without negating important differences found within each age cohort" (Peirce & Fulmer, 1995: 293). In addition it provides a "wholistic, systematic and logical approach to the care of every individual older person" (Peirce & Fulmer, 1995: 293).

Sleep disruption is a common complaint among the general population and Peirce and Fulmer (1995) have applied the Neuman Systems Model to sleep disturbances among the elderly. When the client is admitted to hospital for a severe infection, nursing interventions for the problem are directed towards strengthening the lines of resistance in order to promote secondary prevention and achieve system stability (Peirce & Fulmer 1995). The nurse uses the external resources available, such as "antibiotics, nutritional supplements, fluids, oxygen, chest physiotherapy and adequate rest and sleep" (Peirce & Fulmer, 1995: 296).

Of importance is the nursing assessment, since this assists the nurse to support activites that the client considers important in systems restoration (Peirce & Fulmer, 1995). Taking cultural beliefs into consideration is essential in restoration and maintenance of the health of the older patient (Peirce & Fulmer, 1995).

In explaining their model Sleep Disturbance' (Fig 3), Peirce and Fulmer (1995) equate the flexible lines of defence with good-night time habits and daily actions, a comfortable bed, quiet environment and avoidance of stimulating substances. The normal line of defence is depicted by the quality and quantity of sleep requisite to that client. Internal lines of resistance include the compensatory factors of daytime soporific episodes and naps (Peirce & Fulmer, 1995).

Internal stressors that may break the line of defence include: the ageing process of the central nervous system, causing circadian rhythm imbalances; poor health; loss of independence; unease; nocturia and melancholy (Peirce & Fulmer, 1995). External stressors could be changes in sleep surroundings, noise volumes and abuse from caregivers (Peirce & Fulmer, 1995). Nursing care which includes therapeutic interventions, maintenance of hygiene and communication between the nurse and patient, has been shown to disrupt patients' sleep in hospital (Lei *et al*., 2009; Friese, 2008; Berlin, 1984 & Hilton, 1976).

Primary prevention of sleep interruption includes maintenance of night-time habits and assuring adequate normal daytime actions (Peirce & Fulmer, 1995). "Secondary prevention may include the treatment of sleep-disturbing disease symptoms such as orthopnea, sleep apnoea, nocturia and angina" (Peirce & Fulmer, 1995: 303). Psychological disturbances such as sorrow, worry and despair must also be treated (Peirce & Fulmer, 1995). Tertiary prevention includes education and possible sleep-related behaviour modification so that the individual can avoid future sleep-related complications (Peirce & Fulmer, 1995). Behaviour modification techniques include applying principles of sleep hygiene (Peirce & Fulmer, 1995). The Neuman System Model guides the nurse to conceptualise the geriatric client as an individual, as part of a family and as part of society (Peirce & Fulmer, 1995).

Core

- All physiological functions
- Genetic endowment

Threatened core

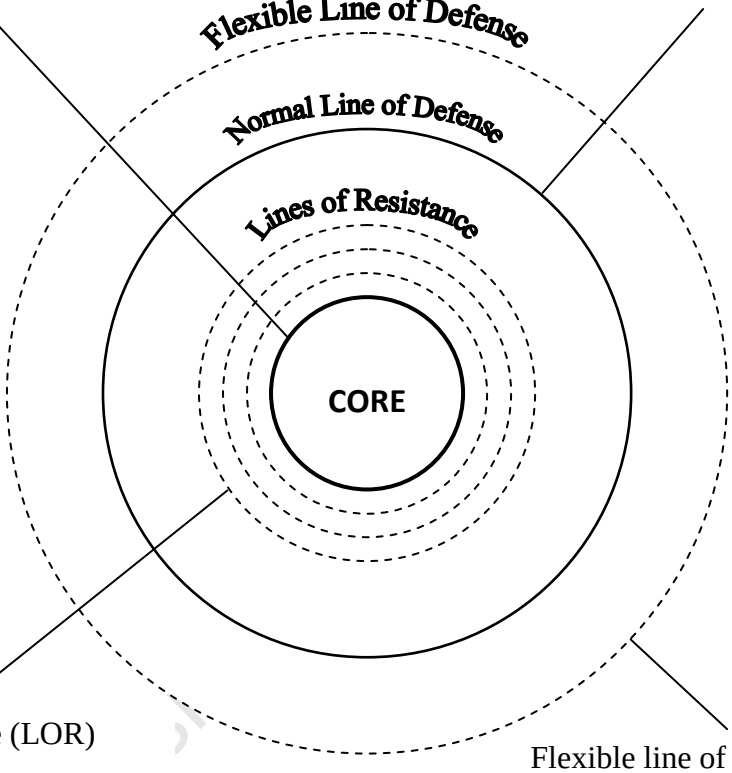
- Sleep disturbance
  (secondary prevention necessary)

Normal line of defense (NLD)

- Usual coping response to environment developed over time
- Normal sleep pattern

Invaded NLD

- Altered sleep pattern
  (secondary prevention necessary)



Lines of resistance (LOR)

- Protects the core
- Compensatory mechanisms
  -Fatigue
  -Naps

Threatened LOR

- The elderly patient
  -Changes in circadian rhythms
  -Depression/grief
  -Presence of chronic disease
  -Debilitated condition
  (secondary prevention necessary)

Flexible line of defence (FLD)

- Protective buffer for NLD
- High level of well-being

Threatened FLD

- Loss of comfortable bed
- Inability to perform sleep-time rituals
- Lack of activity
- Stimulating fluids and alcohol
  (primary prevention necessary)

SLEEP DISTURBANCE

Figure 3: Model depicting sleep disturbance based on the Neuman Systems Model (Peirce & Fulmer, 1995: 304)

3.6 Summary

Models relating to the health of man, are increasingly used to guide nurses in assessing, formulating a nursing diagnosis, planning, implementing, adapting and evaluating patient care. Peirce and Fulmer's model Sleep Disturbance based on the Neuman Systems Model aptly identifies factors which cause sleep disturbances in the elderly patient. Nursing theories which are compatible with the Neuman Systems Model include, Kolcaba's theory of comfort theory and practice and Leininger's theory of culture care diversity and universality in nursing practice. Knowledge and application of The Neuman Systems Model could have guided the respondents in this study to comprehensively identify nursing strategies which cause sleep disturbance and advise patients regarding sleep.

CHAPTER 4

Methodology

4.1 Introduction

This chapter presents the research design, setting, study population, sampling method and sample, questionnaire design, data collection and ethical considerations for this study.

4.2 Aim

The aim of this study was to determine professional nurses' knowledge of sleep and the role of sleep in patient recovery, in a private hospital context.

4.3 Research design

The research design was a quantitative non-experimental study and specifically a cross-sectional descriptive study using the survey method.

4.4 Research site

The research site for this study was a medium-sized private hospital situated in Cape Town, South Africa. The hospital is licensed according to Regulation 158 to accommodate 239 beds (South Africa, 1980). The types of nursing units/wards in this private hospital are categorised into the following groups: medical, surgical (day surgery and medium stay), paediatric, trauma, theatre, orthopaedic, neuroscience, oncology, haematology (out patient, medium and longer stay), bone marrow transplant, obstetric, intensive care and high care (under the legal framework governing private hospitals).

4.5 Study population

The study population for this study comprised professional nurses who met the inclusion criteria (N = 90) and who cared for patients during the day and/or night and who were employed by this private hospital. The patients that these nurses care for sleep on the hospital premises overnight.

4.6 Sampling

A convenience sample was utilised as the study was limited to a single private hospital. Only professional nurses who met the inclusion criteria and agreed to participate were issued with a questionnaire (n = 85).

4.6.1 Inclusion criteria

- Only professional nurses who were employed on a full-time, part-time or agency basis at the private hospital and who were on the premises at least once over the seven-day data collection period.
- The ability to communicate in English, which is the language of professional communication in the hospital and is a job requirement.
- Professional nurses registered with the SANC.
- Professional nurses who cared for patients who required nursing care overnight at the hospital.

4.6.2 Exclusion criteria

- Any nurse who declined to participate in the study or who requested withdrawal from the study before the completed questionnaire was handed to the researcher.
- Nurses who were absent from the hospital (on leave or sick) during the study period.

4.7 Questionnaire design

The survey method was chosen to produce information collected in an "objective, systematic and measurable way" (Polgar & Thomas, 2008: 66). The questionnaire was compiled by the researcher and was not based on existing questionnaires, as no relevant questionnaires could be found. The questions were based on specific directives for professional nurses in South Africa: Regulation 879 (SANC, 1975a); Regulation 881 (SANC, 1975b); Regulation 882 (SANC, 1975c); Regulation 683 (SANC, 1989) and Regulation 425 (SANC, 1985b). These directives include anatomy, physiology, applicable nursing care and patient education.

The questionnaire consisted of closed and open questions. The advantage of a closed question is that the respondent has a choice of set answers to choose from and that may "prompt the respondent to remember responses that may have been forgotten" (Lohr, 2010: 13). The advantage of an open question is that it allows the respondents "to form their own response categories" (Lohr, 2010: 13).

Section A required respondents to answer 23 questions on knowledge of sleep and its role in patient recovery in a hospital context.

Section B required respondents to provide demographic information about their age.

Section C required respondents to provide information about their nursing registration category, shifts, experience and education relating to sleep.

The questionnaire scores were divided into predetermined groups adapted from the University of Cape Town's academic categorisation (University of Cape Town, 2010) and the Regulations relating to examinations of the South African Nursing Council: examination marks and examination results (SANC, 1993). The possible score (%) range was 0% - 100%.

- "To pass a portion a candidate shall obtain at least 50% of the aggregate marks for the portion" (SANC, 1993).
- "To pass a portion with distinction a candidate shall at the first attempt obtain at least 75% of the aggregate marks for the portion" (SANC, 1993).

- 75% to 100% - excellent knowledge
- 65% to 74% - good knowledge
- 50% to 64% - fair knowledge
- 0% to 49% - limited (poor) knowledge (University of Cape Town, 2010).

4.8 Pilot study

A pilot study was conducted in a private hospital situated in one of the suburbs near central Cape Town, which is comparable to the private hospital that was used in the study. The purpose of a pilot study is to enrol a small number of participants and to test every step of the proposed research process (Polgar & Thomas, 2008; Hulley, Cummings, Browner, Grady, Hearst & Newman, 2001). A pilot study presents an opportunity to evaluate the recruitment method and to provide rough estimates of the number of respondents who are willing to participate. Moreover, it allows the researcher to identify and correct problems in the data collection instruments and process. Appropriate changes can then be made prior to the main study (Hulley *et al*., 2001).

Twenty professional nurses who met the inclusion criteria for the pilot study were selected. Only professional nurses in the hospital who met the inclusion criteria were offered the opportunity to partake in this research and were identified from the duty roster kept by the Unit Manager with the permission of the Nursing Manager. A contact person, assigned by the Nursing Manager, served as an assistant to the researcher as required. With the knowledge of the Nursing Manager, the respondents were directly visible to the researcher

at all times. Twenty nurses completed the questionnaire, which was issued together with an information letter over a 4-day period. Immediate return of the questionnaire was required. Based on the feedback, amendments were made to the English and Afrikaans information letter and questionnaire as follows:

- Based on the pilot study, the time estimated to complete the questionnaire was changed on the information letter from 30 minutes to 20 minutes.
- Changes were made in the knowledge and professional profile sections of the questionnaire as outlined below.

Knowledge section

- Numbering of the questionnaire was improved, spelling was corrected where errors were identified and an 'unsure' option was added to question 2. The format of question 22 was improved.

Professional profile

- Question 26 was rephrased.
- Question 27 was revised to include the option of day and night.
- Question 29 was altered from an open question to a closed question in order to simplify the answer (i.e. yes or no).
- Question 30 was simplified to a single answer which excluded the place and year of the education regarding sleep.

The pilot study knowledge results (Appendix E) proved broadly similar to the main study results.

Mean knowledge score (%) pilot study 30.9% and mean knowledge score (%) main study 36.1%.

4.9 Data collection

Once ethical approval had been obtained from the Human Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town, permission to access the hospital was requested in writing from the Nursing Manager of the private hospital. The researcher consulted with the Nursing Manager of the hospital after approval had been granted by the hospital's Ethics Committee. Briefing of the Nursing Manager and the researcher's assistant included the need for autonomy, privacy and confidentiality. The emphasis was that the questionnaire had to be answered from memory and that respondents

were encouraged not to share the questions for the period of data collection. This request was to discourage the possibility of potential respondents sourcing information on the subject of sleep prior to completion of the questionnaire. After consultation with the Unit Managers, the Nursing Manager arranged the period for the study and distribution of questionnaires with the researcher.

The Nursing Manager informed the Unit Managers of units where nurses care for patients who stay overnight, that they had to advise all nursing staff who met the inclusion criteria that permission had been granted for nurses to participate in this study. The nursing staff confirmed being informed of the research. The researcher managed the recruitment process as arranged with the hospital Nursing Manager and Unit Managers.

A name list of all the nurses on each ward, who met the inclusion criteria, was obtained from the Human Resources Department, with relevant permission from management. The name list was arranged according to each nursing unit in which patients who stay overnight were cared for. All the nurses who met the inclusion criteria (n = 90), were approached by the researcher to complete an anonymous questionnaire. Eighty five (85) professional nurses were issued with a questionnaire and information letter.

Questions from participants were answered and each nurse's name was ticked off the name list as they returned the questionnaire. Data were collected from a self-administered questionnaire in either English or Afrikaans. The researcher managed the ethical conduct of the study which included: issuing of the questionnaires, observation of the respondents while they completed the questionnaire, collection of the questionnaires and collation of the answers. Data collection occurred over a one-week period in December 2010.

4.9.1 Response rate

Eighty five questionnaires were distributed to nurses and all were returned.

4.9.2 Non-respondents

Five professional nurses declined to participate in the study.

4.10 Data management

The returned questionnaires were numbered consecutively from 1 to 85. The questions and answers were coded in consultation with a statistician and the data were entered into an Excel spreadsheet by the researcher and an assistant. The number of each question was coded as 01, 02 etc. A number was also assigned to each answer choice, i.e. no = 1, yes =

2 and unsure = 3. For questions with multiple answers, each answer was assigned a consecutive letter of the alphabet. The numeral 1 was assigned to a selected answer choice and 0 if the answer choice was not selected. All of the information obtained is maintained confidentially in a locked cupboard and personal computer with backup flashdrives stored separately.

4.11 Data analysis

The questionnaire data were primarily descriptive. Closed and open questions were evaluated by the researcher for correctness and marked accordingly. The occasional question which was left blank was not allocated a mark. Answers to the open-ended questions were grouped into categories and each category was assigned a letter of the alphabet. Frequency distributions were generated for each item of Section A and the responses were marked according to a previously worked out memo. Descriptive statistics were generated for current age in years (Section B), years of nursing experience (Section C), as well as the total score obtained for the knowledge section (Section A). Answers to the open-ended questions were categorised into groups to make analysis and interpretation of results clearer, e.g. the answers which related to noise were grouped in the "noise" category and 1 mark was allocated per category.

A total score was obtained for each participant by adding up all correct responses in Section A. Frequency tables were used to describe the sample using the data from Sections B and C. Comparisons were made on the total knowledge score between two groupings of the sample: firstly, sleep education during nursing training and secondly, primary shift schedule. The data were analysed using Excel and PASW Statistics (SPSS) for Windows version 19 (SPSS 2011).

Ordinary descriptive statistics of the mean knowledge scores (%) of the day only, night only and day and night duty nurses are presented in chapter 5 and were acquired using ANOVA and regression analyses, provided the percentage data met the requisite normality assumptions, which were tested using visual diagnostic tools such as the histogram, and the Shapiro-Wilks test for normality.

4.12 Ethical considerations

Approval from the University of Cape Town's Faculty of Health Sciences Human Research Ethics Committee (Appendix C) and the private hospital group's Ethics Committee (Appendix D) was obtained prior to commencement of the study. In addition,

permission from the selected Nursing Manager in the hospital was obtained verbally. An information letter, which was attached to the questionnaire (Appendices G & H) informed potential respondents about the nature of the research, that participation in the study was voluntary and confidential and that they had the option of withdrawing without any negative consequences to their role as employees. Once the completed questionnaire was collected, withdrawal was no longer an option as the questionnaires were no longer identifiable.

The safety of the respondents, due to participation in or withdrawal from this research was not compromised. The participants were protected against coercion in that the choice of any respondent to not participate in the study was accepted and not questioned. The fact that 5 respondents declined to participate could be considered indicative of their freedom from coercion. The nursing (Unit Managers and Nursing Managers) and Hospital Managers were not informed of any details pertaining to the participation of the respondents during or after the collection of the completed questionnaires.

The information letter and questionnaires were available in English and Afrikaans. The ethical principles from the World Medical Association Declaration of Helsinki were adhered to (World Medical Association, 2008). These include respect for persons; informed consent; autonomy; confidentiality; privacy; justice; veracity; beneficence and non-maleficence. A resident counsellor is available to hospital employees and was requested to be available to provide support to any respondent who needed to address any issues that may have been triggered by participation in this study.

The correct referenced answers to the questions in the questionnaire were handed to the Nursing Manager, after the information from the completed questionnaires had been collated by the researcher. The Nursing Manager then informed the Unit Managers and respondents of the referenced answers at the hospital. A summary of the results will be made available to the Nursing Manager on request after completion of this study.

Permission was obtained from Betty Neuman for the use of her model and Pierce and Fulmer's model in this research (Appendices A and B).

4.12.1 Non-maleficence and beneficence

Consent from the respondents was considered evident by way of the returned questionnaire and the researcher answered all questions pertaining to the study judiciously.

4.12.2 Confidentiality and anonymity

Each respondent's confidentiality and anonymity was ensured and no personal identifying information was included in the questionnaire. The nursing (Unit Managers and Nursing Managers) and hospital managers were not informed of any details pertaining to the participation of the respondents during or after the collection of the completed questionnaires. Completed questionnaires were seen by the researcher and a statistician and were and continue to be stored in a locked cupboard by the researcher. Questionnaires will be destroyed after the required three-year storage period.

Neither the name of the hospital nor any personal identifying data applicable to the participants have been released in the results.

4.12.3 Researcher-participant relationships

The researcher had previously been employed at the hospital where the research took place. The relationship with the participants was of a professional nature before and during the study.

4.13 Validity and reliability

"Validity is the capacity of a test instrument or question to give a true result" (Bruce, Pope & Stanistreet, 2008: 172). The face and content validity of the questionnaire were tested by a panel of three expert nurses on a grid which required a score and comment on the appropriateness; content validity (face and sampling), construct validity; format and layout and wording. A few questions were removed from the questionnaire due to anticipated difficulty related to technical content and a few of the questions were reworded. Generally the comment was that the questions were adequate regarding the aims and objectives of the study. It was acknowledged that nursing curricula in South Africa do not cover sleep in such depth and that the questions emphasised knowledge of sleep more than the role of sleep in patient recovery. The expert panel validated the questionnaire before the pilot study was conducted. Answers that the researcher proposed for the questions in the questionnaire were checked for correctness against appropriate academic literature. This panel of expert nurses completed the questionnaire independently to test the criteria mentioned. Criterion validity could not be measured as no other similar questionnaire could be found.

Face validity was applied to the study and is defined as "the efficacy of an instrument and the degree of consistency with which it measures the attribute that it is supposed to be measuring" (Polit & Hungler, 1999: 411).

Reliability is defined as "The extent to which a test or measurement result is reproducible" (Polgar & Thomas, 2008: 298). The answers on the answer sheet assessed every response accurately. The length of the questionnaire allowed for credible and valid basic knowledge testing without being unnecessarily complicated (Seaman, 1987). The original questionnaire was translated into Afrikaans to promote objectivity and fairness to the respondents by taking into consideration their culture and language preference (Seaman, 1987), despite the general language of communication being English. The questionnaire was tested during the pilot study and slight alterations were made by deleting unnecessary questions and rewording others.

Reliability and validity were applied to the study as per the requirements that Polit and Hungler (1999: 426) briefly explain: "comprehensibility" (the researcher was able to comprehend the behaviours required to secure accurate and valid measures by keeping the respondent visible in order to ensure that no information was sourced); "balance" (the use of closed and open questions minimised response-set bias and facilitated content validity); "speededness" (enough time was allowed to obtain accurate measurements without rushing the measuring process); "unidimensionality" (a measuring tool as an answer sheet was designed by the researcher to produce separate scores, for unitary concepts to be isolated); "range" (the instrument was capable of achieving a meaningful measure of all the variables, i.e. open and closed answers); "linearity" (measures were equally accurate and sensitive over the entire range of values); "reactivity" (the questions avoided influencing the respondents' choice of answer) and "simplicity" (the instrument was kept basic in order to avoid misunderstanding of the question) (Polit & Hungler, 1999: 412).

4.14 Risks/benefits

The participants, who are nurses, did not benefit from participating in this research other than that it may have initiated an interest in knowledge of sleep. Participation was voluntary. No remuneration was offered to participants, although non-alcoholic refreshments were provided.

4.15 Summary

Permission to do the study was obtained from the Human Research Ethics Committee of the University of Cape Town and the hospital. The research design is a quantitative non-experimental study using the survey method. A convenience sample was utilised. No existing questionnaire could be found on nurses' (professional nurses') knowledge of sleep and its role in patient recovery in a hospital context, so the questionnaire used was compiled by the researcher. Eighty five questionnaires were distributed and returned. The results of the study are presented in Chapter 5.

CHAPTER 5

Results

5.1 Introduction

This study aimed to determine professional nurses' knowledge of sleep and the role of sleep in patient recovery in a private hospital context. A survey was conducted in which 85 questionnaires were issued, completed and returned. The questionnaire comprised three sections: A - knowledge information; B - demographic information and C - professional information. The knowledge questions were based on the study objectives and basic information covered in all nursing curricula: anatomy, physiology, nursing care and patient education.

Scores were worked out according to the question answer sheet. The score range was 0% - 100%. The open question answers were grouped based on the referenced answer sheet. Only age information was asked in the demographic section. The professional information required confirmation of registered nurse status, clinical area/s of work, shift status, years of nursing experience and sleep education received during and after pre-registration nursing education.

5.2 Demographic information

The respondents' ages in years ranged from 25 to 63, with a mean of 44.4 years. It is noted that only 3.53% of the nurses in this study were younger than 30 years, which concurs with 4% of nurses in this age range at national level. Table 4 indicates the ages of the respondents in seven age categories. In order to provide a context for this table, the age range for the respondents is compared to that of nurses on the SANC register for 2010, in the category registered nurses/midwives. It should be noted that the comparison is between professional nurses in a private hospital and registered nurses and midwives nationally. Table 4 demonstrates that the population in this study is broadly similar to the national profile.

Table 4: Age distribution

Age category (years)	Professional nurse respondents (this study)	SANC registered nurses/midwives (SANC, 2011)
Younger than 30	3.53%	4%
30 – 39	27.06%	19%
40 – 49	38.82%	31%
50 – 59	23.53%	29%
60 – 69	3.53%	13%
Older than 69	0%	3%
Not reported/no specific age given	3.53%	1%

5.2.1 Overall knowledge scores according to age distribution

The respondents aged younger than 30 years had the highest overall knowledge score, at 42% and the respondents for whom ages are unknown scored the lowest, at 26.4% as indicated in Table 5 below. The mean knowledge score was 36.1%.

Table 5: Mean knowledge score (%) by age category

Age category (years)	Number of respondents	Mean score (%) per category
Younger than 30	3	42.0%
30 – 39	23	33.8%
40 – 49	33	37.1%
50 – 59	20	37.3%
60 – 69	3	39.1%
No specific age given	3	26.4%

5.3 Professional information

5.3.1 Day and night shifts

24.7% of the respondents worked only night shift, 44.7% worked only day shift and 30.6% worked both day and night shifts, as indicated in Figure 4 below.

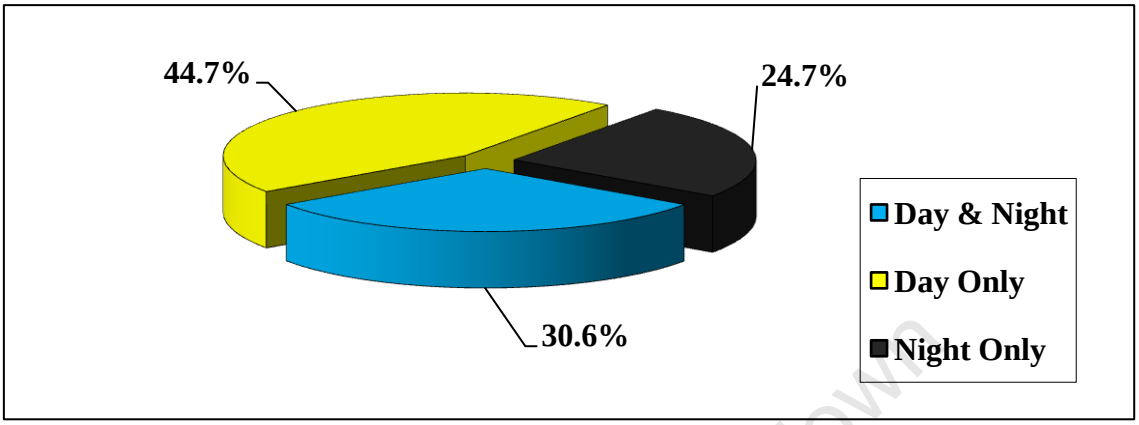


Figure 4: Percentage of respondents that worked day and night shifts, or day shift only, or night shift only

5.3.1.1 Knowledge scores according to shifts worked

Professional nurses who worked day and night shifts had the highest overall knowledge score at 41%; the day-duty shift scored 35.7% and the night-duty shift scored the lowest at 30.8%, as indicated in Table 6. The average score for all respondents was 36.1%.

Table 6: Mean knowledge score (%) by duty shifts

Shifts worked	% of respondents	Mean knowledge score (%)
Day and night duty	30.6%	41.0%
Day duty only	44.7%	35.7%
Night duty only	24.7%	30.8%

The ANOVA test was used in the comparison of the mean knowledge scores (%) for the different shift duties which indicated that the average scores were significantly different ($F = 9.105$, $p < 0.001$), and the subsequent regression analysis indicated that the average percentage is 5.3% ($p = 0.013$, Coefficient: -5.34, 95% CI: -9.5:-1.2) less for nurses working the day duty only versus those working both the day and night duties, and 10.3%

(p < 0.0001, Coefficient: -10.26, 95% CI: -15.1:-5.5) less for those working the night duty only versus those working both.

5.3.2 Years of nursing experience after first registration as a nurse

The years of nursing experience after first registration with the SANC are indicated in Figure 5 below. The nursing experience of the respondents ranged from 1 year to 41 years, with a mean of 18.58 years: 8.4% had 1-5 years' experience (of which 1 year was the minimum); 16.9% had 6-10 years' experience; 15.7% had 11-15 years' experience; 12.1% had 16-20 years' experience; 20.5% (the largest group) had 21-25 years' experience; 14.5% had 26-30 years' experience; 4.8% had 31-35 years' experience; 3.6% had 36-40 years' experience and 1.2% had 41-45 years' experience, of which 41 years was the maximum.

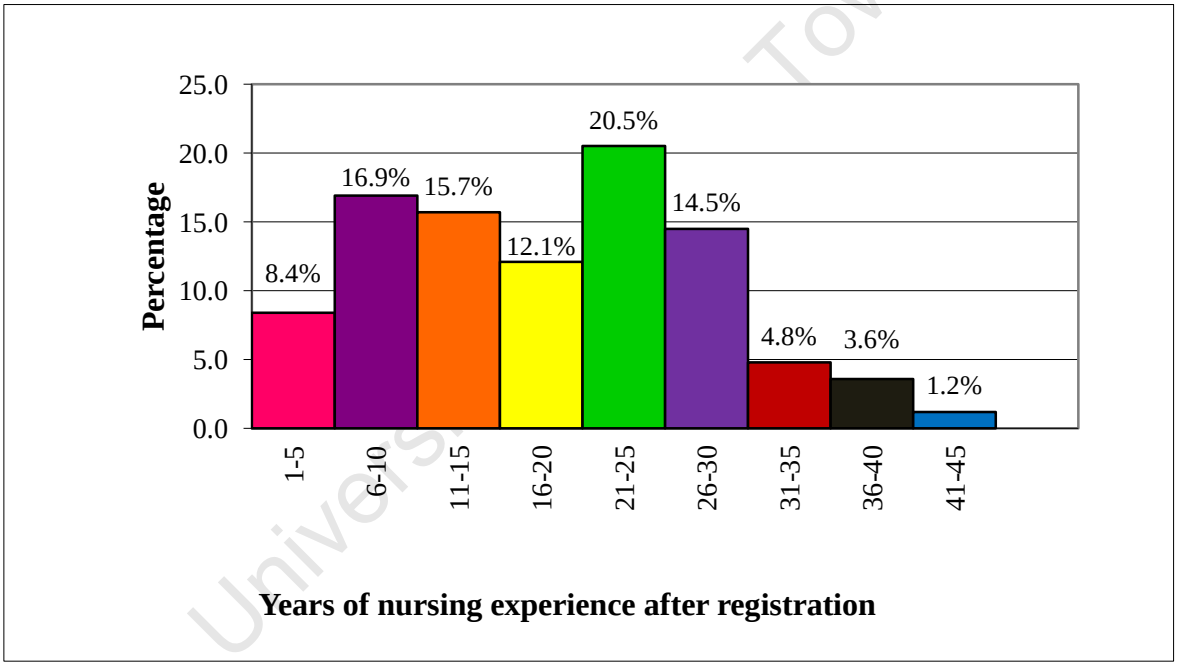


Figure 5: Years of nursing experience after first registration with the SANC

5.3.3 Number and percentage distribution of sleep education received by respondents as part of their nursing curriculum and their percentage knowledge scores

The single respondent who was unsure about whether education relating to sleep occurred in her/his nursing curriculum scored the highest of the three groups at 43.1% (did receive education, did not receive education and unsure). Those that did receive education relating

to sleep in their nursing curriculum scored second highest at 40.1% and those that did not receive education relating to sleep in their nursing curriculum scored the lowest at 34.8%, as indicated in Table 7.

Table 7: Knowledge scores for respondents according to whether education specifically relating to sleep had been received in their nursing curriculum or not

	Number of respondents	Percentage of respondents	Mean score (%)
Respondents who **did** receive education relating to sleep in their nursing curriculum	20	23.5%	40.2%
Respondents who **did not** receive education relating to sleep in their nursing curriculum	64	75.3%	34.8%
Respondents who were **unsure**	1	1.2%	43.1%

5.3.4 Number and percentage distribution of nurses that received post-registration education pertaining to sleep (after completion of nursing training)

79 (92.9%) of the respondents reported not receiving any education pertaining to sleep after the completion of their nursing training, 5 (5.9%) reported receiving education pertaining to sleep after completion of their nursing training and 1 (1.2%) was unsure, as indicated in Figure 6 below.

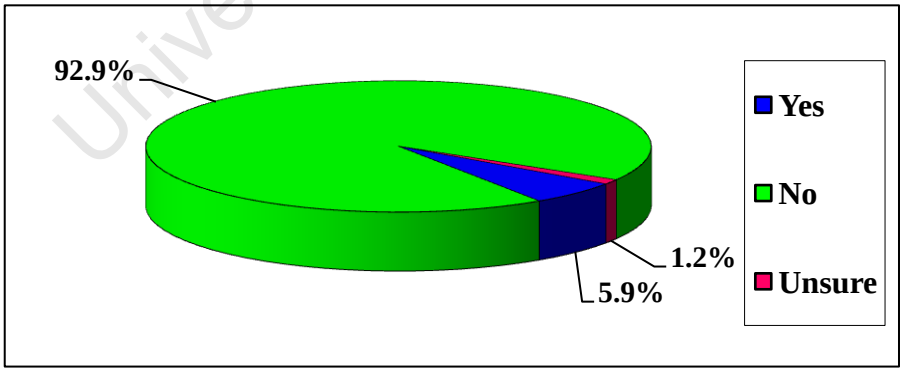


Figure 6: Percentage of nurses that received post-registration education pertaining to sleep (after completion of nursing training)

Those that did receive education relating to sleep after completion of their nursing training scored the highest of the three groups at 43.1% (did receive education, did not receive education and unsure). Those that did not receive education relating to sleep after completion of their nursing training scored 35.8%. The single respondent who was unsure about whether education relating to sleep occurred after completion of her/his nursing training scored the lowest at 29.3%, as indicated in Table 8.

Table 8: Knowledge scores for respondents according to whether education specifically relating to sleep had been received after completion of their nursing training or not

	Number of respondents	Percentage of respondents	Mean score (%)
Respondents who **did** receive education relating to sleep after completion of their nursing training	5	5.9%	43.1%
Respondents who **did not** receive education relating to sleep after completion of their nursing training	79	92.9%	35.8%
Respondents who were **unsure**	1	1.2%	29.3%

5.4 Knowledge

Results from the questionnaire have been grouped under the two main objectives and five sub-objectives of this study:

- Objective 1: To determine what percentage of questions in a questionnaire on sleep was correctly answered by nurses who care for patients who stay overnight.
- Sub-objectives pertaining to objective 1 address the following aspects of sleep: 1a) the process of normal human sleep; 1b) the physiological effect of sleep on the human body; 1c) the role of sleep in the maintenance of health; 1d) the risks associated with insufficient sustained sleep and 1e) the role of sleep in patient recovery in a hospital context.
- Objective 2: To elicit nurses' knowledge of sleep-promoting activities/techniques.

The knowledge section of the questionnaire included questions pertaining to anatomy, physiology, nursing care and patient education relating to the promotion of sleep.

The anatomy-related section of the questionnaire comprised a single closed question (No. 13); while the physiology-related section consisted of closed questions (Nos. 1 – 12 and 14 – 19) and two open questions (Nos. 20 and 22).

The nursing care and patient education part of the questionnaire consisted of two open questions (Nos. 21 and 23).

Three out of the four open questions in the questionnaire required multiple answers.

The results of the questionnaire have been recorded in frequency tables.

Closed questions: The frequency of correct answers to each question have been totalled and converted into a percentage and recorded in the relevant tables.

Open questions: Every respondent's answers or proposed strategies have been grouped into various categories, with frequency of responses for each category converted into a percentage. The percentage responses are recorded in the relevant tables.

The average score on knowledge for all respondents was 36.1%, with a range of 12.1% to 56.9%. Most of the closed questions were answered incorrectly or as "do not know" or "unsure": 81 of the 85 respondents obtained < 50% (limited/poor knowledge) and the remaining 4 obtained 50% - 64% (fair knowledge).

5.4.1 Objective 1: To determine what percentage of questions in a questionnaire on sleep was correctly answered by nurses who care for patients who stay overnight

5.4.1.1 Sub-objective 1a: The process of normal human sleep

As indicated in Table 9, the questions for which the respondents scored above 50% were question Nos. 4, 15 and 16, as follows:

No. 4: Normal human sleep consists of two states known as non-rapid eye movement (NREM) sleep and is followed by rapid eye movement (REM) sleep, **True** (75.3%); **No. 15**: Variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors, **True** (83.5%); **No. 16**: In the older adult deterioration of sleep patterns results in fragmented sleep at night, with increased sleepiness and sleep during the day, **True** (84.7%).

Gaps in knowledge relating to the process of normal human sleep were revealed by the answers to question Nos. 5-9, 13 and 17-19:

No. 5: Non-rapid eye movement (NREM) sleep is divided into two stages, **False** (14.1%); **No. 6**: Rapid eye movement (REM) sleep is divided into four stages, **False** (17.7%): **No.7**: Rapid eye movement (REM) sleep is a phase which is not associated with dreaming, **False** (49.4%).; **No. 8**: The combined non-rapid eye movement (NREM) and rapid eye movement (REM) sleep cycle occurs about every 90 min and reoccurs four to six times per average sleep episode in the young adult, **True** (37.7%); **No. 9**: During which phase of sleep has total loss of muscle tone (atonia) been found to occur in humans? **Rapid eye movement** (25.9%); **No. 13**: Circadian rhythms in humans, including sleep-wake cycles, are initiated by the suprachiasmatic nucleus (SNC). In which part of the brain is the suprachiasmatic nucleus located? **Anterior hypothalamus** (9.4%); **No. 17**: The two-process model suggests that the timing of sleep and waking is determined by the interaction between process S (dependent on duration of prior sleep and waking) and process C (circadian process), **True** (35.3%); **No. 18**: Newborn sleep is divided into rapid eye movement (REM) sleep, non-rapid eye movement (NREM) sleep and indeterminate sleep, **True** (37.7%); **No. 19**: The newborn sleep cycle is on average 120 minutes, **False** (12.9%).

Table 9: Questions, answers and percentage of correct responses for closed questions grouped under study sub-objective 1a: The process of normal human sleep

Question No.	Questions	Answers (Correct answer in italics)	Percentage of correct responses
04	Normal human sleep consists of two states known as non-rapid eye movement (NREM) sleep and is followed by rapid eye movement (REM) sleep.	False	**75.3%**
		True	
		Unsure	
05	Non-rapid eye movement (NREM) sleep is divided into two stages.	*False*	**14.1%**
		True	
		Unsure	
06	Rapid eye movement (REM) sleep is divided into four stages.	*False*	**17.7%**
		True	
		Unsure	
07	Rapid eye movement (REM) sleep is a phase which is not associated with dreaming.	*False*	**49.4%**
		True	
		Unsure	
08	The combined non-rapid eye movement (NREM) and rapid eye movement (REM) sleep cycle occurs about every 90 min and reoccurs four to six times per average sleep episode in the young adult.	False	**37.7%**
		True	
		Unsure	
09	During which phase of sleep has total loss of muscle tone (atonia) been found to occur in humans?	Non-rapid eye movement	**25.9%**
		Rapid eye movement	
		Unsure	
13	Circadian rhythms in humans, including sleep-wake cycles, are initiated by the suprachiasmatic nucleus (SNC). In which part of the brain is the suprachiasmatic nucleus located?	Posterior hypothalamus	**9.4%**
		Anterior hypothalamus	
		Unsure	
15	Variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors.	False	**83.5%**
		True	
		Unsure	
16	In the older adult deterioration of sleep patterns results in fragmented sleep at night, with increased sleepiness and sleep during the day.	False	**84.7%**
		True	
		Unsure	
17	The two-process model suggests that the timing of sleep and waking is determined by the interaction between process S (dependent on duration of prior sleep and waking) and process C (circadian process).	False	**35.3%**
		True	
		Unsure	
18	Newborn sleep is divided into rapid eye movement (REM) sleep, non-rapid eye movement (NREM) sleep and indeterminate sleep.	False	**37.7%**
		True	
		Unsure	

19	The newborn sleep cycle is on average 120 minutes.	*False*	**12.9%**
		True	
		Unsure	

5.4.1.2 Sub-objective 1b: The physiological effect of sleep on the human body

This sub-objective comprised closed questions 2, 3 and 14 and open question 20. The percentage of correct scores is represented in Table 10.

The question in which the respondents scored above 50% was question No. 3 (84.7%) which related to the composition of the autonomic nervous system.

Limited knowledge or gaps in knowledge (scores below 50%) were identified in specific questions pertaining to the physiology of sleep: **No. 2** (22.4%) which addressed circadian rhythms; **No. 14** (28.2%) and **No. 20** (27.1%), both relating to the hormone melatonin.

Table 10: Questions, answers and percentage of correct responses for closed and open questions grouped under study sub-objective 1b: The physiological effect of sleep on the human body

Question No.	Questions	Answers (Correct answer in italics)	Percentage of correct responses
02	What are circadian rhythms relating to sleep?	Circadian rhythms follow an approximate 12-hour cycle through a complex process linked to light and dark.	**22.4%**
		Circadian rhythms take place as an approximate 24-hour cycle through a complex process linked to light and dark.	
		Circadian rhythms are more or less 12-hour cycles of behaviour and physiology that are generated by endogenous biological clocks.	
		Unsure.	
03	The autonomic nervous system (ANS) regulates the vital functions of internal homeostasis and is composed of the sympathetic nervous system and parasympathetic nervous system.	False	**84.7%**
		True	
		Unsure	
14	Which environmental factor mainly influences the secretion of the pineal hormone, melatonin?	Light	**28.2%**
		Darkness	
		Unsure	
20	What is the physiological function of melatonin in humans concerning sleep?	*Melatonin is a hormone which has been shown to promote sleep in humans.*	**27.1%**

5.4.1.3 Sub-objective 1c: The role of sleep in the maintenance of health

92.9% of the respondents correctly answered Question 1, which related to the perception of the role of sleep in the maintenance of health: Is uninterrupted sleep a major contributory factor for health? (Table 11).

Table 11: Question, answer and percentage of correct responses for closed Question 1, grouped under study sub-objective 1c: The role of sleep in the maintenance of health

Question No.	Question	Answers (Correct answer in italics)	Percentage of correct responses
01	Is uninterrupted sleep a major contributory factor for health?	No	**92.9%**
		Yes	
		Unsure	

5.4.1.4 Sub-objective 1d: The risks associated with insufficient sustained sleep

Questions 10, 11 and 12 were all closed questions; results are depicted in Table 12.

Question 10 addressed knowledge pertaining to the health disorders initiated or increased by regularly disturbed sleep. The disorder correctly identified as not being a health disorder which can be initiated or increased by regularly disturbed sleep was Down syndrome (98.8%). Health disorders correctly identified as being initiated or increased by regularly disturbed sleep were depression (91.8%), compromised concentration (77.7%) and psychiatric disorders (68.2%).

Limited knowledge or gaps in knowledge (scores < 50%) were for: altered immune response (45.9%); obesity (40%); metabolic syndrome (32.9%); cardiovascular disease (31.8%); diabetes mellitus (16.5%) and cancer (12.9%).

Question 11 pertained to the sleep disorder of snoring with 58.8% correctly identifying snoring as a sleep disorder.

Question 12 pertained to the association of obstructive sleep apnoea with illness and death and 90.6% of respondents answered the question correctly.

Table 12: Questions, answers and percentage of correct responses for closed questions grouped under study sub-objective 1d: The risks associated with insufficient sustained sleep

Question No.	Questions	Answers (Correct answer in italics)	Percentage of correct responses
10	Which of the following health disorders can be initiated or increased by regularly disturbed sleep? Several options may be applicable.	j. Down syndrome (Trisomy 21)	**98.8%**
		e. *Depression*	**91.8%**
		b. *Compromised concentration*	**77.7%**
		a. *Psychiatric disorders*	**68.2%**
		i. *Altered immune response*	**45.9%**
		c. *Obesity*	**40.0%**
		g. *Metabolic syndrome*	**32.9%**
		h. *Cardiovascular disease*	**31.8%**
		f. *Diabetes mellitus*	**16.5%**
		d. *Cancer*	**12.9%**
11	Does primary snoring fall within the scope of sleep disorders?	No	**58.8%**
		Yes	
		Unsure	
12	Is obstructive sleep apnoea associated with an increased risk of poor health and death?	No	**90.6%**
		Yes	
		Unsure	

Question 21, depicted in Table 13 was an open question:

List as many environmental factors as possible within the hospital context which *unnecessarily* cause patients to have interrupted sleep.

Environmental factors appropriately selected by the respondents were noise/disturbance (98.8%), light (68.2%) and discomfort (63.5%).

The respondents identified **noise/disturbance** as (verbatim): "noise from equipment; moving trolleys; moving patient beds; leaking taps; screaming patients; *toelatings gedurende nag* (admissions during the night); phone rings; emptying dustbins; unanswered bells; snoring patients; confused *pasiënte* (patients); polishers; air conditioning; winds and bad weather conditions; interruption of sleep for medication administration; nurses rounds; hourly observations; nurses' shoes and talking nurses; background noise".

Light was described as (verbatim): "bright lights; TV's; lights in ward; *lig* (light); light shining from flashlight; lights that burns late; degree of light". **Discomfort** was identified

as (verbatim): "*pyn* (pain); worry; pyrexia and sweating; urinary incontinence; constipation; unusual aromas; care and turns; monitor leads; drip site discomfort; insufficient food or poor quality food; pillows can also be uncomfortable; lack of privacy".

Environmental factors which also may cause disturbed sleep, which were less often mentioned by respondents were: pain (34.1%); environmental temperature and poor ventilation (24.7%); incorrect timing of the administration of medication (17.7%); lack of hygiene (5.9%); inadequate analgesia (2.4%) and stimulants (1.2%).

Table 13: Percentage of responses obtained for open question No. 21: Environmental factors in a hospital which unnecessarily disturb patients' sleep, under study sub-objective 1d: The risks associated with insufficient sustained sleep

Question No.	Environmental factors in a hospital which unnecessarily disturb patients' sleep	Percentage of responses
21b	Noise/disturbance	98.8%
21a	Light	68.2%
21e	Discomfort	63.5%
21h	Pain	34.1%
21f	Environmental temperature and poor ventilation.	24.7%
21d	Incorrect timing of administration of medication, especially insomnia-producing medication	17.7%
21g	Lack of hygiene	5.9%
21c	Inadequate analgesia	2.4%
21i	Stimulants	1.2%

5.4.1.5 Sub-objective 1e. The role of sleep in patient recovery in a hospital context

Open Question 22 pertained to the physiology of sleep:

What is the physiological function of each of the following with respect to patient recovery in a hospital context? 22a: Non-rapid eye movement (NREM); 22b: Rapid eye movement (REM) and 22c: Rest.

This open question pertaining to the physiology of sleep elicited a limited range of answers. The questions, answers and scores are presented in Table 14.

The only two broadly appropriate answers to Question 22a (NREM) from respondents were (verbatim) "brings rest brain cell recovery" and "repair of tissues".

For question 22b (REM), no appropriate answers were written down by respondents.

For question 22c (Rest) the only two broadly appropriate answers were (verbatim) "recovering of the body developing of new cells" and "cellular repair".

It was evident that there was limited knowledge of the physiological function of Non-rapid eye movement sleep (2.4%), Rapid eye movement sleep (0%) and Rest (2.4%). None of the respondents scored 50% or more for the answers to this question.

Table 14: Questions, answers and percentage of responses for open question No. 22 grouped under study sub-objective 1e: The role of sleep in patient recovery in a hospital context.

Question No.	Question	Answers (Appropriate answer in italics)	Percentage of responses
22 **22a**	What is the physiological function of each of the following with respect to patient recovery in a hospital context? Non-rapid eye movement (NREM)	*During non-rapid eye movement (NREM), the body releases human growth hormone for the repair and renewal of epithelial and specialised cells such as brain cells.*	**2.4%**
22b	Rapid eye movement (REM) and	*Rapid eye movement (REM) sleep appears to be important for cognitive restoration.*	**0%**
22c	Rest.	*Protein synthesis and cell division for the renewal of tissues occur during rest.*	**2.4%**

5.4.2 Objective 2: To determine nurses' knowledge of sleep-promoting activities/techniques.

Question 23, depicted in Table 15 was an open question:

As a registered nurse, what strategies do you use for improving or advising patients regarding sleep, in the hospital in which you work?

Strategies appropriately provided by the nurses to this question included minimise noise/disturbances (78.8%), minimise light (57.7%) and ensure comfort (56.5%).

For **minimise noise/disturbance,** strategies specified by the respondents included (verbatim) "taking newborn to the nursery for mom to sleep; quietness; eliminate background noises; *verminder geraas* (reduce noise); ensure all TV's, radios are switched off; reduce noise as much as possible e.g. staff talking, switch off TV's; telephone calls etc; earplugs; staff are not to wear noise shoes and night time nursing interventions early in evening".

For **minimise light,** strategies specified by respondents included (verbatim): "ensure lights and television is off; try to make it as dark as possible; adjust light dim if possible; no bright lights; *skakel ligte af* (switch lights off); *donker omgewing* (dark environment); eye pads and use torches instead of big lights".

Ensuring comfort, strategies listed included (verbatim) "make sure comfortable in bed; put them on comfortable positions; *kalm rustige atmosfeer* (calm relaxed environment); make patient as comfortable and warm as possible; keep ill, groaning or dying patient's seperate; ensure a comfortable mattress and pillows; ensure patient at a comfortable temperature; ensure room temp is comfortable; *skoon gemaklike bed* (clean comfortable bed); therapeutic atmosphere; own pillows; patients needs to empty their bladders before bedtime and assure the patient's are kept dry".

There was limited knowledge relating to strategies which can be used to improve or advise patients regarding sleep in a hospital context. Those that were listed were: reduce/eliminate pain (42.4%); reassure/explain (35.3%); promote hygiene (15.3%); deter the use of stimulants (12.9%); promote alternative and complementary therapies (12.9%); provide adequate nutrition and hydration (12.9%); promote regular sleep/wake pattern (11.8%); correct timing of administration of medication (8.2%); listen to the patients' concerns (5.9%); provide adequate ventilation (5.9%); promote passive/active exercise during the day (4.7%); ensure safety of the patient (4.7%) and include loved ones/familiar items (3.5%). None of the respondents wrote the words 'documented and applied planned care', 'care plan' or '*versorg plan*' (care plan) as a strategy to improve patients' sleep. Writing and applying an individualised care plan per patient is standard procedure at the hospital where the study was done.

Table 15: Percentage of responses obtained for open question No. 23: Strategies used by the respondents for improving or advising patients regarding sleep under study objective 2: To determine nurses' knowledge of sleep-promoting activities/techniques

Question No.	Strategies used for improving or advising patients regarding sleep.	Percentage of responses.
23a	Minimise noise/disturbances	78.8%
23b	Minimise light	57.7%
23d	Ensure comfort	56.5%
23e	Reduce/eliminate pain	42.4%
23f	Reassure/explain.	35.3%
23o	Promote hygiene	15.3%
23c	Deter the use of stimulants	12.9%
23g&h	Promote alternative and complementary therapies	12.9%
23m	Provide adequate nutrition and hydration	12.9%
23n	Promote regular sleep/wake pattern	11.8%
23j	Correct timing of administration of medication	8.2%
23k	Listen to the patients' concerns	5.9%
23p	Provide adequate ventilation	5.9%
23l	Promote passive/active exercise during the day	4.7%
23q	Ensure safety of the patient	4.7%
23i	Include loved ones/familiar items	3.5%

5.5 Written and verbal explanation of REM and NREM

The English questionnaire explicated the terms REM and NREM (rapid eye movement and non rapid eye movement) whereas the Afrikaans questionnaire merely stated 'REM' and 'NREM'. The Afrikaans meaning of REM and NREM, *'vinnige oog beweging'* and *'nie vinnige oog beweging'*, was provided to the Afrikaans candidates verbally.

A separate analysis of the questions containing the terms REM and NREM was done to check if this may have affected the scoring of these questions (Table 16).

Table 16: Comparison of average scores of the 11 Afrikaans questionnaires and 74 English questionnaires for Question Nos. 04-09, 18, 22a & 22b which contained the abbreviations REM and NREM

Question No.		**04**	**05**	**06**	**07**	**08**	**09**	**18**	**22a**	**22b**
Afrikaans	11	54.5%	9.1%	18.2%	36.4%	36.4%	18.2%	36.4%	0%	0%
English	74	78.4%	14.9%	17.6%	51.4%	37.8%	27.0%	37.8%	2.7%	0%
Overall mean score (%)		75.3%	14.1%	17.7%	49.4%	37.7%	25.9%	37.7%	2.4%	0%

A summary of the mean correct scores is indicated in table 16 is presented in Table 17.

Table 17: Summary of the results in Table 16

Summary	**Average correct score (%)**
Afrikaans (11)	23.2%
English (74)	29.7%
Total (85)	28.9%

Mean scores of the 11 Afrikaans questionnaires and 74 English questionnaires for questions **not** containing the terms REM and NREM are compared in Table 18.

A summary of the mean correct scores is indicated in Table 19 and it is noted that the total percentage score of the non-affected Afrikaans questions remained lower, albeit marginally (37.1%), than for the questions in English (37.5%).

Table 18: Comparison of average scores of the 11 Afrikaans questionnaires and 74 English questionnaires for questions not containing the terms REM and NREM (Question Nos. 01-03, 10-17, 19-21, 22c and 23)

Question No.		**01**	**02**	**03**
Afrikaans	11	90.9%	0%	90.9%
English	74	93.2%	25.7%	83.8%
Overall mean score (%)		92.9%	22.4%	84.7%

Question No.		**10a**	**10b**	**10c**	**10d**	**10e**	**10f**	**10g**	**10h**	**10i**	**10j**
Afrikaans	11	72.7%	81.8%	18.2%	18.2%	90.9%	9.1%	27.3%	27.3%	27.3%	100.0%
English	74	67.6%	77.0%	43.2%	12.2%	91.9%	17.6%	33.8%	32.4%	48.6%	98.6%
Overall mean score (%)		68.2%	77.7%	40.0%	12.9%	91.8%	16.5%	32.9%	31.8%	45.9%	98.8%

Question No.		**11**	**12**	**13**	**14**	**15**	**16**	**17**	**19**	**20**
Afrikaans	11	72.7%	90.9%	18.2%	27.3%	100.0%	90.9%	18.2%	27.3%	9.1%
English	74	56.8%	90.5%	8.1%	28.4%	81.1%	83.8%	37.8%	10.8%	29.7%
Overall mean score (%)		58.8%	90.6%	9.4%	28.2%	83.5%	84.7%	35.3%	12.9%	27.1%

Question No.		**21a**	**21b**	**21c**	**21d**	**21e**	**21f**	**21g**	**21h**	**21i**	**22c**
Afrikaans	11	72.7%	100.0%	0%	18.2%	63.6%	36.4%	0%	27.3%	0%	0
English	74	67.6%	98.6%	2.7%	17.6%	63.5%	23.0%	6.8%	35.1%	1.4%	2.7%
Overall mean score (%)		68.2%	98.8%	2.4%	17.7%	63.5%	24.7%	5.9%	34.1%	1.2%	2.4%

Question No.		**23a**	**23b**	**23c**	**23d**	**23e**	**23f**	**23g&h**	**23i**	**23j**	**23k**
Afrikaans	11	81.8%	72.7%	9.1%	63.6%	45.5%	27.3%	18.2%	0%	9.1%	9.1%
English	74	78.4%	55.4%	13.5%	55.4%	41.9%	36.5%	12.2%	4.1%	8.1%	5.4%
Overall mean score (%)		78.8%	57.7%	12.9%	56.5%	42.4%	35.3%	12.9%	3.5%	8.2%	5.9%

Question No.		**23l**	**23m**	**23n**	**23o**	**23p**	**23q**	**23r**
Afrikaans	11	0%	9.1%	0%	36.4%	9.1%	0%	0%
English	74	5.4%	13.5%	13.5%	12.2%	5.4%	5.4%	0%
Overall mean score (%)		4.7%	12.9%	11.8%	15.3%	5.9%	4.7%	0%

Table 19: Summary of the results in Table 18

Summary	Average correct score (%)
Afrikaans (11)	37.1%
English (74)	37.5%
Total (85)	37.4%

5.6 Summary

The advancing age of nurses is evident, which corroborates the average years of nursing experience. The extremely limited sleep education in the nursing curriculum, as well as after first registration with the SANC is evident and possibly explains the respondents' limited knowledge of sleep and its role in patient recovery in a hospital context. Answers which were provided correctly by the nurses and categories which were formed according to respondents' answers, have been identified and demonstrate overall limited knowledge on the role of sleep in patient recovery in a hospital context. The average knowledge score for all of the respondents was 36.1%.

CHAPTER 6

Discussion, limitations, recommendations and conclusions

6.1 Discussion

6.1.1 Introduction

The aim of this study was to determine professional nurses' knowledge of sleep and the role of sleep in patient recovery in a private hospital context.

This chapter will discuss the results presented in the previous chapter, the possible implications of knowledge deficits for patient care and provide recommendations for nursing curricula and in-service education. The conceptual framework of Neuman's Systems Model has been used to conceptualise the findings of this study. The limitations of this study and challenges encountered during this research process are addressed.

6.1.2 Demographic characteristics

Of all the respondents, 38.8% fell into the 40-49 year age category, while 3.5% were younger than 30 and 3.5% were aged 60-69 years. These figures concur with the literature which draws attention to worldwide shortage of nurses and other health care professionals (Lewis, 2010a, 2010b; Drury, Francis & Chapman, 2009; Allan & Aldebron, 2008; Clarke & Cheung, 2008; Donelan, Buerhaus, DesRoches, Dittus & Dutwin, 2008; Johnson, Billingsley & Costa, 2006; Armstrong, 2002). There are a number of reasons for this shortage which fall beyond the scope of this discussion. Three themes pertaining to nurses leaving clinical nursing which were identified by MacKusick & Minick (2010: 337) are: "unfriendly workplace, emotional distress relating to patient care, fatigue and exhaustion".

6.1.3 Professional profile

All of the respondents confirmed that they were registered nurses or equivalent professional nurses and they had an average of 18.58 years of nursing experience. This finding together with the average age of the respondents (44.4 years) concurs with the academic (SANC, 2011; Johnson *et al*., 2006) and public health concern pertaining to the advancing average age of nurses worldwide. The possibility thus exists that a large number of nurses will retire within the next few years without adequate provision for replacement of the nursing workforce.

6.1.4 Nurses' knowledge of sleep and its role in patient recovery versus age

The knowledge scores per age category revealed that the nurses who were aged 30 and younger scored the highest (42%), the nurses who were aged 30-39 scored the second lowest (33.8%), and the nurses who omitted to specify their age scored the lowest at (26.4%). Overall the mean remained below 50% which highlights that this topic would be a useful addition to the continuing education programme for registered nurses.

6.1.5 Nurses' knowledge of sleep and its role in patient recovery versus shifts worked

Of interest is the comparison of knowledge among the nurses who work the day only, night only and day and night shifts. The group of nurses that indicated that they worked both day and night shifts scored the highest (41%) and the group that worked only night duty scored the lowest (39.6%). In-service education tends to take place mainly during the day and therefore access to continuing/in-service education for this group needs to be considered.

6.1.6 Nurses' knowledge of sleep and its role in patient recovery in general

The single respondent who could not remember whether education pertaining to sleep had been provided in her nursing curriculum scored the highest (43.1%). The 20 respondents who did receive education pertaining to sleep in their nursing curriculum scored second highest (40.2%) and the respondents who did not scored the lowest (34.8%). Sleep education may not have been sufficiently emphasised, integrated or applied in the respondents' training but this cannot be established from this survey. The role and function of in-service training programmes, the topics included and the application of these to practice is another aspect of interest which may need further investigation. Most health facilities provide regular in-service training and clinical updates, yet the effectiveness of such input is often difficult to evaluate.

Knowledge of the process of normal human sleep (sub-objective 1a) dealt with general questions pertaining to sleep: the two states of sleep REM and NREM; variances in sleep requirements for adults which are affected by environmental, genetic and social factors and that sleep becomes fragmented in the older adult. The more commonly known aspects were: the two states of sleep; the factors which influence sleep and deterioration of sleep in the older adult. The lesser known aspects relating to sleep were: REM and NREM

(stages, length, dreaming, cycles, loss of muscle tone, newborn sleep); anatomy (suprachiasmatic nucleus) and the model pertaining to sleep (process S and process C).

Sub-objective 1b required knowledge of the physiological effect of sleep on the human body pertaining specifically to circadian rythms, the autonomic nervous system and environmental factors which influence the secretion of the hormone melatonin. The commonly known aspect of sleep pertained to the autonomic nervous system which was scored at 84.7%. This question is a basic physiology question which pertains to every physiological system in the human body including sleep and this could explain why most of the respondents scored above 50%. The lesser known aspects of sleep which scored at <50% were: circadian rhythms and the hormone melatonin.

Sub-objective 1c addressed the role of uninterrupted sleep as a major contributory factor for health. The respondents demonstrated effective knowledge in this aspect of sleep.

Sub-objective 1d addressed knowledge pertaining to the health disorders initiated or increased by regularly disturbed sleep. The main conditions which result from or in disturbed sleep are depression, compromised concentration and psychiatric disorders and these were well recognised by the respondents. Limited knowledge identified in the responses pertaining to other health disorders included altered immune response, obesity, metabolic syndrome, cardiovascular disease, diabetes mellitus and cancer. This variation in knowledge has implications for good patient management, as the less well recognised effects of sleep disturbance and deprivation can be missed by nursing staff and therefore not managed, reported or remedied.

The environmental factors within the hospital context which unnecessarily cause patients to have interrupted sleep were included under sub-objective 1d. The commonly specified environmental factors were: noise/disturbance, light and discomfort. Less frequently noted environmental factors were pain, environmental temperature and poor ventilation, incorrect timing of administration of medication (especially insomnia-producing medication), lack of hygiene, inadequate analgesia and stimulants. Promoting an environment which enables sleep in hospital is challenging (Reid, 2001). Knowledge of Neuman's explanation of the term environment may have enabled the respondents to answer this question effectively. Neuman identifies the environment as "internal and external forces surrounding man, influencing and being influenced by the client at any point in time" (Neuman, 1982: 9). "The created environment" is a subconscious defensive environment which harnesses

energy in man and includes the internal and external patient environments (Neuman, 1995: 45).

Precise knowledge of the physiological function of NREM, REM and rest was required for questions 22a, 22b and 22c which were applicable to sub-objective 1e: The role of sleep in patient recovery in a hospital context. During NREM sleep the body releases human growth hormone for the repair and renewal of epithelial and brain cells (Rosenthal, 2009; Mathew, 2008; Horne, 2006). REM sleep appears to be important for cognitive restoration and rest is required for protein synthesis and cell division for the renewal of tissues (Rosenthal, 2009; Mathew, 2008; Horne, 2006). The respondents did not demonstrate this knowledge. A more indepth understanding of the physiological functions of sleep may enable nurses to better support sleep promoting strategies in hospital settings.

Objective 2 attempted to determine nurses' knowledge of sleep promoting activities/techniques. The commonly reported activities and techniques which addressed patient care and patient education were: miminise noise/disturbances; minimise light and ensure comfort. Less frequently reported activities/techniques were: reduce/eliminate pain; reassure/explain; promote hygiene; deter the use of stimulants; promote alternative and complementary therapies; provide adequate nutrition and hydration; promote regular sleep/wake pattern; correct timing of administration of medication; listen to the patients' concerns; provide adequate ventilation; promote passive/active exercise during the day; ensure safety of the patient and include loved ones and familiar items. This may indicate a lack of knowledge or awareness of a number of areas which were not explicitly asked in this survey, including the actual content of sleep promotion and management in nursing curricula or lack of awareness of the importance of what may sometimes be considered peripheral issues which impact on sleep.

6.1.7 The extent of the problem

Insomnia and inadequate sleep in human beings results either in or from an imbalance in the human body which often causes or is caused by stress, which may result in illness. Inadequate sleep has been shown to be a cause of poor concentration for the patient and carer, which often results in the inability to function safely and effectively in the home, on the road and at work (Brown, 2009; Walsh *et al*., 2005). To be effective, nurses need comprehensive knowledge of sleep and its role in patient recovery and should be able to apply this in their nursing practice.

6.1.8 Workplace culture

A systematic approach enables nursing and healthcare teams to practice in an organised manner. This enables the achievent of goals which promote health or dignified palliative care and death. The identification and achievement of patient-centred goals requires critical thinking which assists in improved quality of nursing care for the patient. Components of critical thinking entail: identifying and defining a problem; extracting critical information for problem solving; drawing conclusions from evidence; extrapolating assumptions; hypothesising; deducing conclusions; elucidating the meaning from the information obtained and weighing up the inferences reached (Quinn, 1995).

Central to optimal patient care is respecting and valuing each individual as a unique being with rights and engaging with them in a way that promotes their dignity, sense of worth and independence (Mann, Gruskin, Grodin & Annas, 1999). If the health of a patient is improved, it often impacts positively on the family and the community (Mann *et al*., 1999).

Neuman (2002) acknowledges the importance of caregiver understanding of and sensitivity to conscious and unconscious psychological, sociological and cultural aspects of patient behaviour. This includes cognisance of aspects which impact patient, family and community habits: language, values, beliefs, religion, rituals and traditions as these may impact on cooperation and compliance with recommended healthcare practices and/or medication. Education in the workplace on transcultural practices is thus important for nurses as the outcome affects wholistic patient care i.e. individualised factors which may contribute to disturbed sleep.

6.1.9 Application of Neuman's model to nursing and sleep

"The two major components of nursing are education and practice" and they cannot function independently (Neuman, 1982: 4). Neuman's model of man's protective ability to deal with stressors is relevant to nursing care and nurses' knowledge of sleep and its role in patient recovery in a hospital context, as it offers structure to the nursing of the patient. Without the basic requirements for life, man cannot survive and as previously shown, sleep is one of the basic requirements for life - hence the importance of sleep to health. Sleep disturbance in a hospital environment is often secondary to a primary complaint and application of Neuman's comprehensive and holistic view of the patient and relationship with the carer/nurse is relevant to this study.

Obtaining a sleep history during the admission and hospital stay of a patient could serve to guide the nurse's planning of patient care more effectively. Using the nursing process in a cyclical fashion ("data collection, nursing diagnosis, expected outcomes/goals, nursing interventions, evaluation and revision") can assist in a systematic method of problem solving for the nurse (Neuman, 1982: 90). Use of systematic frameworks such as the nursing process can assist the nurse with effective nursing of the patient, as it can promote critical thinking which occurs during analysis and interpretation of the information obtained (Freiburger, 2011). In South Africa, record keeping is a legal requirement for nurses when nursing a patient and it is included in the nursing process. Record keeping is evidence of a written plan of action and the nursing care that was carried out (Mellish, Brink & Paton, 2004).

Primary, secondary and tertiary prevention intervention is part of the nurse's responsibility when caring for a patient (Neuman, 1982); these are utilised in a hospital context, with tertiary prevention intervention beginning during preparation for the patient's discharge. Sleep disturbance can thus be prevented, managed and reduced by nurses during the patient's hospital stay and in anticipation of the patient returning home.

6.1.10 Nursing care plan

Inclusion of an existing or anticipated sleeping problem in the individualised care plan, utilising objective and subjective information, will allow the nurse to apply the prevention intervention strategy recommended by Neuman (1982). When life cannot be salvaged, it will promote consistent care for the dying patient.

It is recommended that the nursing process be applied in a written plan of nursing care (care plan) to structure the individualised assessment of the client on admission (DeYoung, 2009). A nursing care plan also assists the nurse with the assessment of the client's health problems; formulation of a relevant nursing diagnosis; the planning of the patient's care; the documentation of achievable outcomes; the implementation of achievable nursing goals to resolve patient problems and the adapting of care as required. If care plans are copied from literary examples or ones already completed in the practical setting, then it is questionable whether they promote problem-solving and critical thinking (Gaberson & Oermann, 2007). Recognition of sleep disorders or potential sleep disruptions will assist the nurse to adapt the care of the patient to promote sleep, healing and health. Implementation of the care plan in consultation with the patient and the cyclical

reassessment of the patient's progress is recommended in order for the patient and the nurse to resolve the patient's problems (Neuman, 1982). For proactive and accurate nursing care to take place, the nurse has to have sufficient knowledge of the potential or actual health problem.

The present study has demonstrated that there is a need for sleep education, nursing curricula and in-service training programmes. None of the respondents stated that a care plan pertaining to sleep should be utilised even though it is hospital policy to compile an individualised care plan for every patient. The scientific nursing process or a theoretical model pertaining to nursing was also not mentioned as a strategy to structure the nursing care for a patient in a hospital context. This could have been stated as one of the answers to Question 23 which asked, *as a registered nurse, what strategies do you use for improving or advising patients regarding sleep, in the hospital in which you work*?

6.1.11 Wholistic nursing care

Neuman recommends that the "physiological, psychological, sociocultural, developmental and spiritual" aspects of health be considered synergistically and nurses therefore need to demonstrate consideration of all of these variables when nursing a patient (Neuman, 2011: 16). None of the respondents made mention of all five variables in response to questionnaire items 21 and 23.

Neuman shows breadth of thought by acknowledging that every patient has a conscious and unconscious structure which implies a psychoanalytical aspect (Neuman & Fawcett, 2002). An understanding of the conscious and unconscious structure of a patient can promote sleep through an understanding of the patient's denial or sustained hope process (Neuman & Fawcett, 2002). The recognition of the spiritual or religious aspects of nursing and patient care can play a role in reducing patient anxiety and thereby promoting sleep. This aspect was not mentioned by respondents and may point to the lack of a wholistic approach to care in nursing curricula.

6.1.12 Intervention tool

In order to simplify systems theory, Neuman, (1982) formulated an adaptable assessment intervention tool, which the health professional should complete in consultation with the patient at or soon after admission. The tool has the following sections: biographical information; stressors as perceived by the patient; stressors as perceived by the care-giver/nurse; nursing diagnosis; goals with rationale and brief intervention explanations

specifying actions required to achieve the stated goals (Neuman, 1982). Perceived or potential sleep disturbances can be identified during the acquisition of this information from the patient. Knowledge of nursing models, especially the Neuman Systems Model, could have guided the respondents in the answering of Questions 21 and 23 in a wholistic manner.

6.1.13 Implications of limited sleep knowledge

Nurses have a key role in understanding the consequences of poor quality sleep and in promoting optimal sleep conditions for adults and elderly (Hoffman, 2003). Children's sleep problems are equally important (Bandla & Marcus, 2009; Moorcroft, 2009; Rosen, 2009; Sheldon, 2009). Sleep problems often go unnoticed by health professionals because their recognition is dependent on adequate knowledge of sleep physiology; the signs and symptoms of sleep related problems and evidence-based interventions (Hoffman, 2003). The questionnaire in this study therefore concentrated minimally on the anatomy relating to sleep and focussed on the physiology of sleep, the causes of sleep-related problems and evidence-based sleep-promoting interventions (nursing care and patient education).

The implications of sleep knowledge for nurses are that greater judgement is required in deciding when patient care schedules should be carried out, sources of noise and disturbance should be eradicated, managed or coordinated and more methods of reducing patient anxiety and promoting physical relaxation could be employed (Hilton, 1976). A caring attitude based on the knowledge of the importance of quality sleep and ways to minimise avoidable disturbances, would contribute to optimal patient care (Hilton, 1976).

Indications of sleep problems in a person being nursed include: unusual behaviour change; prolonged day time soporific episodes; unexplained confusion; memory vagueness; excessive yawning and irritability (Hoffman, 2003). It is important for nurses to be aware of the effects and side-effects of all medicinal products that may be self-administered by the patient or administered by the nurse. The importance of the effects and side-effects pertains to the timing of administration of the prescribed or self-administered medication in hospital or at home and the avoidance of stimulants in order to minimise insomnia (Hoffman, 2003). It is important for the nurse to realise that sleep disturbances may become increasingly common in older adults and that sleep problems increase in severity with age (Ayalon & Ancoli-Israel, 2009).

Evidence-based nursing interventions should be applied to address difficulty in sleeping, and include sleep education for the patient; enabling behavioural changes; modifying the patient's environment and planning care (Hoffman, 2003). Patient education should include age-related changes in sleep; sleep journalling to assess sleep affecting factors and the effectiveness of sleep enhancing treatment (Hoffman, 2003).

Nursing interventions include: obtaining a sleep history on admission which may alert the nurse to sleeping irregularities; organising patient care to facilitate relaxation of the patient and maintenance of normal circadian rhythms; consistently analysing patient behaviour for irritability, unexplained memory loss, reduced problem-solving abilities, frequent yawning, excessive amounts of day time sleeping and analysis of the timing and use of current medication and the associated side-effects (including alchohol and over the counter supplements and medication) (Hoffman, 2003). Sleep disturbing factors may vary from ward to ward and it is therefore necessary to audit each ward to determine the factors which impact on disturbed sleep (Reid, 2001). Feedback from the patients may illucidate the sleep disturbing factors which need to be corrected, as environmental factors in isolation are not exclusively responsible for disrupted sleep (Reid, 2001). Psychological and physiological factors are other potential causes for disrupted sleep (Reid, 2001). In order for the nurse to accurately advise the patient, the nurse's knowledge has to be detailed and all-encompassing.

6.2 Limitations of the study

6.2.1 Introduction

The limitations which emerged during this research process are addressed. The challenges that were encountered during this research process are addressed in relation to the methodology and the questionnaire.

The study was restricted to a single hospital. A more extensive study would provide more generalisable information.

6.2.2 Questionnaire

Although a sample of convenience has the potential for bias, in this limited study it was the most appropriate given the limited number of registered nurses employed at the private hospital. The response rate however provided sufficient data to answer the research question.

6.2.2.1 Section A: Knowledge

The option of ticking an 'unsure box' for the open questions (Nos. 20-23) was verbally requested by several of the respondents in the main study, who would have preferred to merely tick a box rather than write the words 'unsure' or 'do not know'. It is unlikely that this negatively impacted on the study results.

For the Afrikaans respondents the term REM and NREM, for which there are no equivalent Afrikaans abbreviations, were verbally explained, as the full phrases '*vinnige oog beweging'* and *'nie vinnige oog beweging'* had been omitted. This may have affected the ability of the respondents to make a decision about the answer to these questions. When the results of the English respondents were compared to the results of the Afrikaans respondents for the affected questions, the Afrikaans results were generally lower. The impact of this could not be ascertained.

6.2.2.2 Section B: Professional Profile

Question 26 in the Afrikaans questionnaire was not changed when the question was reworded after the pilot study. The meaning of the question could have been differently understood and this question was therefore not analysed as it does not specifically address the aim or objectives of this study.

The question which was not amended and therefore not analysed:

Pilot study In the last 12 months, in which clinical area have you worked for more than 6 months?

In watter kliniese area het U vir meer as 6 maande gewerk gedurende die laaste 12 maande?

Main study In the last 12 months, in which clinical areas have you worked?

*In watter kliniese area het U vir meer as 6 maande gewerk gedurende die laaste 12 maande? (*In the last 12 months, in which clinical area have you worked for more than 6 months?).

6.2.2.3 Section C: Demographic Profile

The results were documented and statistically analysed strictly according to the respondents' answers. However, there appeared to be a discrepancy with three of the respondents' answers when comparing age and experience after registration with the South

African Nursing Council. The three respondents would have been aged at 12 years, 14 years and 14 years at the time of registration with the South African Nursing Council. The analysis represented in Figure 6 has excluded the three respondents.

6.3 Recommendations

6.3.1 Introduction

Based on the findings of this study, it is evident that knowledge of sleep among professional nurses is limited and a cause for attention in nursing education and nursing practice. A number of recommendations based on the findings of the study are presented which could serve to promote nurses' knowledge of sleep and application of that knowledge to patient recovery in a hospital context. The recommendations are divided into recommendations for nursing education, for professional nurses, for nursing practice, the hospital organisation and for future nursing research.

6.3.2 Recommendations for nursing education

- The importance of uninterrupted sleep for the human species should be a core component of the fundamental programme. Emphasis should be placed on the importance of adequate sleep which enables health and healing.
- The nursing curriculum at diploma and degree level should include defined modules with specific learning outcomes pertaining to the topic of sleep and the effect that it has on health and healing.
- Evaluated practice opportunities must be included in order to assess application of the knowledge acquired and should include formal evaluation: cognitive, psychomotor and affective. Examples of practice opportunities are: the inclusion of a sleep history on admission; the compilation, execution and adaptation of a nursing care plan which addresses actual and potential health problems holistically; pharmacological implications for sleep; environmental (internal, external, created) needs pertaining to sleep; legal implications pertaining to sleep; alternative and complementary therapies e.g. guided imagery; the influence of supplements and medications on sleep and culturally-based differences pertaining to sleep i.e. beliefs and habits.

6.3.3 Recommendations for professional nurses

- Life-long learning should be encouraged by the employers of all professional nurses and this should include access to academic information on sleep i.e. literature via the Internet, in hard copy (Journals and text books), sleep clinics, In-service education, distance courses, visual presentations, case studies, seminars and conferences.

6.3.4 Recommendations for nursing practice

- An integrated approach by all managers involved in hospital management should include best practice policies which promote optimal sleep conditions for patients.
- Academic and clinical staff must be proactive in encouraging the improvement and application of knowledge to ensure the promotion of sleep of the patient.
- Learning opportunities must be provided equally for the day and night shifts.
- The application of the care plan should accurately reflect the sleep pattern of the patient every night and sleep promotion interventions instituted.
- Nursing Care plans should be audited for the inclusion of sleep problems, practical strategies to correct or limit these problems and daily evaluation of the success of the strategies applied. Accurate and timeous application of the care plan strategies should be monitored with the implementation of corrective measures when required.
- Accurate reporting of patient sleep to nursing teams and physicians as relevant.

6.3.5 Recommendations for the hospital organisation

- Policies applicable to the promotion of sleep should be put into practice in order to increase patient satisfaction, service excellence and quality improvement.
- Individual accountability and compliance with noise reduction policies can be enhanced by including hospital staff members from various hospital departments in the policy development process.
- In-service training sessions for all nurses on day and night shifts must include regular expert education on sleep and how minimally interrupted sleep can safely be achieved in a hospital setting.

- Sleep knowledge and sleep promotion modules should be included in the continuing education credit system of the organisation.

6.3.6 Recommendations for future nursing research

- An intervention study comprising a pre- and post-test on sleep, evaluation of the application of the sleep knowledge acquired at a practical level and feedback from the patients nursed in a hospital setting.
- Research investigating nurses' educational needs in South Africa pertaining to sleep promotion, could facilitate the development of learning objectives and outcomes.
- Knowledge of cross-cultural differences pertaining to sleep would serve to broaden the understanding of the sleep needs of hospitalised patients.

6.4 Conclusion

This study has highlighted that the registered/professional nurses' knowledge of sleep in a private hospital is limited. Adequate sleep for human beings is imperative to sustain health and healing. Nurses are in a key, visible and unique position to promote health and healing and their knowledge of sleep is important in achieving this nursing function. The nurse carries the responsibility to provide health education about sleep and advise or refer patients with sleep related problems. Education and optimal care of the patient by the nurse can be compromised if the nurse has insufficient knowledge of sleep and is unable to promote nursing care which promotes sleep. Sleep is an important component of patient recovery and the inclusion of all aspects of sleep and its role in patient recovery in the nursing curriculum and in-service training in the workplace will be useful in supporting the promotion of knowledge among nurses, identifying areas of nurses' lack of knowledge and the promotion of the awareness of the importance of sleep to patient recovery.

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Appendices

Appendix A: Letter of request and approval response from Dr Betty Neuman to use the Neuman Systems Model in this dissertation.

Flatlet
26 White Road
Plumstead
7800
CAPE TOWN
SOUTH AFRICA

e-mail: mmpinna@yahoo.com
mobile: +01127 76 979 8374

13 September 2009

P O Box 77
Watertown
OHIO
USA
45787

Dear Dr Betty Neuman

REQUEST FOR PERMISSION TO USE NEUMAN'S HEALTH-CARE SYSTEM AND MODEL

I am a part-time final year post-graduate Master's student at the University of Cape Town currently compiling a mini dissertation on "A Survey of Nurses' Knowledge of Sleep and its Role in Patient Recovery in a Hospital Context". All costs incurred are currently self-funded.

I hereby request permission in writing, to make use of Neuman's Health-Care System and Model in my mini dissertation.

I look forward to your imminent favourable response.

Yours sincerely

Marisa P M Pinna RN, RM, N Ad, N ed, BN.

10/21/09
Dear Marisa,
Your above request is honored & accepted. The customary fee for use of the model is $50.00 U.S. currency.
Best Wishes,
Betty Neuman

Appendix B: Letter of request and approval response from Dr Betty Neuman to use Peirce and Fulmer's model in this dissertation.

29 White Road
Rumstead
7800
Cape Town
South Africa
mmpinna@yahoo.com
021 7521250
076 979 8374

15 May 2011

P O Box 77
Watertown
OHIO
USA
45787

Dear Dr Betty Neuman

URGENT REQUEST FOR PERMISSION TO USE PEIRCE & FULMER's MODEL

I have been unable to source the Authors Pierce and Fulmer and I am hereby asking for written permission from you on their behalf, to make use of their model in my MSc minor dissertation. Their model is titled 'Sleep Disturbance' which appears in your text book (Neuman 1995).

The only Neuman 1995 text book in South Africa has gone missing, so I am unable to specify the page number.

I am self-funded and have very little money, although will send you the essential fee once I have been specified of the amount.

In 2009 you granted me permission to use your model and my sister Clara Woodley who lives in San Diego paid the customary fee of $50 on my behalf. She will not be able to cover this fee however. Thank you again for your kindness and telephone call in 2009.

Kindly inform me of the exact method of payment required, the department and person to whom the fee must be addressed to.

Thank you for the invitation to attend the 13th Biennial Neuman Systems Model Symposium Unfortunately my financial situation can not provide for my trip to America and my attendance.

Sincerely

Marisa Pinna

Dear Barbara,

I would like you to include in the book of your complete dissertation ... thank you!

The information you want follows:

Chapter 19 - entitled "Application of the Herman Systems Model to Client Original Nursing" pages 303 - 308. in

the Herman Systems Model 2nd edition 1995:
Application to Large by Betty Herman

The subtitle on page 303 is called "Step Distance"

Authors of this chapter are:
1. Anne Gaincott Pierce
2. Tony F. Palmer.

You have my permission to use & document their work from my book.

Best Wishes,
Betty Herman 6/25/11

My home telephone 6/15 - 8/29 is (540) 749-3332.
Best calling time 10 AM 12 Noon - Ohio time.

Appendix C: Ethics approval.

UNIVERSITY OF CAPE TOWN

Health Sciences Faculty
Research Ethics Committee
Room 1.62-34 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 404 7682 • Facsimile [021] 406 6411
e-mail: [illegible]

05 October 2010

HREC REF: 307/2010

Ms M Piana
C/o Dr P Mayers
Health & Rehab
Old Main Building

Dear Ms Piana

PROJECT TITLE: A SURVEY OF NURSES' KNOWLEDGE OF SLEEP AND ITS ROLE IN PATIENT RECOVERY IN A HOSPITAL CONTEXT.

Thank you for submitting your study to the Research Ethics Committee for review.

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above mentioned study.

Approval is granted for one year until 15 October 2011.

Please submit an annual progress report if the research continues beyond the approval period. Alternatively, please submit a brief summary of your findings so that we can close our records.

Please send all updated versions and informed consent documents to the HREC.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS

This serves to confirm that the University of Cape Town Research Ethics Committee complies with the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC)

Please

Appendix D: Permission from hospital group to access the hospital.

25 November 2010

Ms M Pinna
29 White Road
PLUMSTEAD
7800

Dear Marisa

PERMISSION TO CONDUCT RESEARCH AT

Your research proposal entitled "*A survey of nurses' knowledge of sleep and its role in patient recovery in a hospital context*" refers.

It is in order for you to conduct your research at and I wish you success with this project.

Yours sincerely

ESTELLE JORDAAN
Nursing Executive

Appendix E: Comparison between pilot and main study results followed by remaining pilot study results.

Demographic information

Age of respondents (pilot and main study)

Table E1 indicates the ages of the respondents from the pilot and main study and the SANC data in seven categories. The respondents' ages in years ranged from 28 to 65, with a mean of 40.5 years. It is noted that 10% of the nurses in the pilot study were younger than 30 years compared to 3.53% in the main study. The pilot study results differ markedly from the main study and the SANC statistics, the latter which indicate 4% of nurses in this age range at national level. It is noted that the SANC register for 2010, in the category includes registered nurses and midwives (SANC, 2011).

Table E1: Age distribution (pilot and main study)

Age category (years)	No.	Pilot study	Main study	SANC registered nurses/midwives (SANC, 2011)
Younger than 30	2	10.0%	3.53%	4%
30 – 39	9	45.0%	27.06%	19%
40 – 49	3	15.0%	38.82%	31%
50 – 59	4	20.0%	23.53%	29%
60 – 69	1	5.0%	3.53%	13%
Older than 69	0	0%	0	3%
Not reported/no specific age given	1	5.0%	3.53%	1%

Overall knowledge scores according to age distribution (pilot and main study)

The respondents aged 50 - 59 years had the highest overall knowledge score, at 41.8% and the respondents aged younger than 30 years scored the lowest at 23.3% as indicated in Table E2 below. The respondents who omitted to specify their age scored second lowest. The mean knowledge score was 30.9%. The knowledge scores for every age category in the pilot study differed from the main study.

Table E2: Knowledge scores according to age distribution (pilot and main study)

Age category (years)	No. of respondents	Pilot study mean score % per category	Main study mean score % per category
Younger than 30	2	23.3%	42.0%
30 – 39	9	28.7%	33.8%
40 – 49	3	29.9%	37.1%
50 - 59	4	41.8%	37.3%
60 – 69	1	31.0%	39.1%
No specific age given	1	25.9%	26.4%

Knowledge scores according to shifts worked (pilot study)

50% of the respondents worked mainly day duty and had a knowledge score of 34.5%. 50% of the respondents worked mainly night duty and had a knowledge score of 27.4%, as indicated in Table E3 below.

Table E3: Knowledge scores according to shifts worked (pilot study)

Shifts worked	% of respondents	Mean score %
Mainly day duty	50.0%	34.5%
Mainly night duty	50.0%	27.4%

Professional information

Years of nursing experience after first registration as a nurse (pilot study)

The years of nursing experience after first registration with the SANC are indicated in Table E 4 below. The nursing experience of the respondents ranged from 1 year to 34 years, with a mean of 13.85 years: 40% had 1-5 years' experience (of which 1 year was the minimum); 15% had 6-10 years' experience; 5% had 11-15 years' experience; 5% had 16-20 years' experience; 10% had 21-25 years' experience; 15% had 26-30 years' experience (the largest group); 10% had 31-35 years' experience; 0% had 36-40 years' experience and 0% had 41-45 years' experience.

Table E4: Years of nursing experience after first registration as a nurse (pilot study)

Years of experience after registration	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
No. of respondents	8	3	1	1	2	3	2	0	0
% of respondents	40%	15%	5%	5%	10%	15%	10%	0%	0%

Number and percentage distribution of sleep education received by respondents as part of their nursing curriculum and their percentage knowledge scores (pilot study)

The single respondent who was unsure about whether education relating to sleep occurred in her/his nursing curriculum scored the lowest of the three groups at 30.2% (did receive education, did not receive education and unsure). Both those who did and those who did not receive education relating to sleep in their nursing curriculum scored the same at 31%, as indicated in Table E5.

Table E5: Knowledge scores for respondents according to whether education specifically relating to sleep had been received in their nursing curriculum or not (pilot study)

	No. of respondents	% of respondents	Mean score %
Respondents who **did** receive education relating to sleep in their nursing curriculum	10	50.0%	31.0%
Respondents who **did not** receive education relating to sleep in their nursing curriculum	8	40.0%	31.0%
Respondents who were **unsure**	2	10.0%	30.2%

Number and percentage distribution of nurses that received post-registration education pertaining to sleep after completion of nursing training (pilot study)

17 (85%) of the respondents reported not receiving any form of education regarding sleep after the completion of their nursing training, 1 (5%) reported receiving some form of education regarding sleep after completion of nursing training and 2 (10%) were unsure, as indicated in Table E6 below.

Those that were unsure as to whether they received any form of education regarding sleep after completion of their nursing training scored the highest of the three groups at 38.8% (did receive education, did not receive education and unsure). Those that did not receive any education regarding sleep after completion of their nursing training scored 30.5%. The single respondent who did receive any education after completion of her/his nursing training scored the lowest at 22.4%, as indicated in Table E6.

Table E6: Knowledge scores for respondents according to whether education specifically relating to sleep had been received after completion of their nursing training or not (pilot study)

	No. of respondents	% of respondents	Mean score %
Respondents who **have not** received any form of education regarding sleep after completion of their nursing training	17	85.0%	30.5%
Respondent who **had** received some form of education regarding sleep after completion of nursing training	1	5.0%	22.4%
Respondents who were **unsure**	2	10.0%	38.8%

Knowledge of sleep and its role in patient recovery in a hospital context (pilot study)

Based on the statistical analysis of the pilot study questionnaires the more commonly known aspects of sleep were: that sleep is fragmented in the older adult; that Down syndrome (Trisomy 21) is not initiated or increased by regularly disturbed sleep; that uninterrupted sleep is a major contributory factor for health; that variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors; that depression, psychiatric disorders and compromised concentration can be initiated by or increased by regularly disturbed sleep; that the environmental factor within a hospital which unnecessarily cause patients to have interrupted sleep is noise/disturbance; that the autonomic nervous system regulates sleep; that the autonomic nervous system regulates the vital functions of internal homeostasis and is composed of the sympathetic and parasympathetic nervous system; that normal human sleep consists of two states REM and NREM; that obstructive sleep apnoea is associated with poor health and death and that newborn sleep is divided into three stages (Table E7).

Limited knowledge or gaps in knowledge regarding aspects of sleep as indicated in Table E7 were: the composition and length of a sleep cycle; the length and regularity of the combined REM and NREM cycles of sleep; what circadian rhythms relating to sleep are; the stages of REM sleep; that NREM is not associated with dreaming and that total loss of muscle tone occurs during REM sleep; that primary snoring is a sleep disorder; the composition and function of the two-process model; the length of a circadian rhythm pertaining to sleep; that darkness influences the secretion of the pineal hormone melatonin; the composition of NREM; the anatomical position of the suprachiasmatic nucleus; the length of the newborn sleep cycle; the physiological function of melatonin in humans.

Further limited knowledge or gaps in knowledge were that the following health disorders can be initiated or increased by regularly disturbed sleep: cardiovascular disease; obesity; altered immune response; metabolic syndrome; diabetes mellitus and cancer. In addition, that environmental factors within a hospital which unnecessarily cause patients to have interrupted sleep are: light; discomfort; environmental temperature and/or ventilation; pain; lack of hygiene; stimulants; inadequate timing of medication; inadequate analgesia and the role of REM, NREM and rest in patient recovery in a hospital (Table E7).

Lesser known strategies used for improving or advising patients regarding sleep in a hospital were: minise noise/disturbances; reduce/eliminate pain; reassure/explain; ensure

comfort; minimise light; promote hygiene; promote a regular sleep-wake pattern; deter the use of stimulants; promote alternative and complementary therapies; correct timing of administration of medication; listen to patients' concerns; provide adequate nutrition and hydration; ensure safety of the patient; provide adequate ventilation; include loved ones/familiar items and write and implement a care plan (Table E7).

Table E7: Percentage of correct responses obtained for closed knowledge questions and open knowledge questions in the pilot study questionnaire

Question No.	Question and answer (Correct answer in italics)		Percentage of correct responses
01a	Is uninterrupted sleep a major contributory factor for health?	No	95%
		Yes	
		Unsure	
02a	What are Circadian rhythms relating to sleep?	Circadian rhythms follow an approximate 12 hour cycle through a complex process linked to light and dark.	30%
		Circadian rhythms take place as an approximate 24 hour cycle through a complex process linked to light and dark	
		Circadian rhythms are more or less 12-hour cycles of behaviour and physiology that are generated by endogenous biological clocks.	
03a	The autonomic nervous system (ANS) regulates the vital functions of internal homeostasis and is composed of the sympathetic nervous system and parasympathetic nervous system.	False	80%
		True	
		Unsure	
04a	Normal human sleep consists of two states known as non-rapid eye movement (NREM) sleep and is followed by rapid eye movement (REM) sleep.	False	70%
		True	
		Unsure	
05a	Non-rapid eye movement (NREM) sleep is divided into two stages.	*False*	20%
		True	
		Unsure	
06a	Rapid eye movement (REM) sleep is divided into four stages.	*False*	25%
		True	
		Unsure	
07a	Rapid eye movement (REM) sleep is a phase which is not associated with dreaming.	*False*	25%
		True	
		Unsure	
08a	The combined non-rapid eye movement (NREM) and rapid eye movement (REM) sleep cycle occurs about every 90 min and reoccurs four to six times per average sleep episode in the young adult.	False	35%
		True	
		Unsure	

09a	During which phase of sleep has total loss of muscle tone (atonia) been found to occur in humans?	Non-rapid eye movement	15%
		Rapid eye movement	
		Unsure	
10a	Which of the following health disorders can be initiated or increased by regularly disturbed sleep? Several options may be applicable.	*Psychiatric Disorders*	85%
		Compromised concentration	60%
		Obesity	25%
		Cancer	5%
		Depression	95%
		Diabetes Mellitus	10%
		Metabolic Syndrome	20%
		Cardiovascular disease	30%
		Altered Immune response	25%
		Down Syndrome (Trisomy 21)	100%
11a	Does primary snoring fall within the scope of sleep disorders?	No	40%
		Yes	
		Unsure	
12a	Is obstructive sleep apnoea associated with an increased risk of poor health and death?	No	65%
		Yes	
		Unsure	
13a	Circadian rhythms in humans, including sleep-wake cycles, are initiated by the suprachiasmatic nucleus (SNC). In which part of the brain is the suprachiasmatic nucleus located?	Posterior hypothalamus	5%
		Anterior hypothalamus	
		Unsure	
14a	Which environmental factor mainly influences the secretion of the pineal hormone, Melatonin?	Light	30%
		Darkness	
		Unsure	
15a	Variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors.	False	95%
		True	
		Unsure	
16a	In the older adult deterioration of sleep patterns results in fragmented sleep at night, with increased sleepiness and sleep during the day.	False	100%
		True	
		Unsure	
17a	The two-process model suggests that the timing of sleep and waking is determined by the interaction between process S (dependent on duration of prior sleep and waking) and process C (circadian process).	False	35%
		True	
		Unsure	
18a	Newborn sleep is divided into rapid eye movement (REM) sleep, non-rapid eye movement (NREM) sleep and indeterminate sleep.	False	50%
		True	
		Unsure	
19a	The newborn sleep cycle is on average 120 minutes.	*False*	10%
		True	
		Unsure	

20a	What is the physiological function of Melatonin in humans concerning sleep?	*Melatonin is a hormone which has been shown to promote sleep in humans.*	15%
21a	List the environmental factors within the hospital which unnecessarily cause patients to have interrupted sleep.		
a	Light		30%
b	Noise/disturbance		90%
c	Inadequate analgesia.		0%
d	Incorrect timing of administration of medication, especially insomnia producing medication		0%
e	Discomfort		35%
f	Environmental temperature and poor ventilation.		25%
g	Lack of hygiene		5%
h	Pain		35%
i	Stimulants		0%
22	What is the role of sleep and rest in patient recovery in a hospital context? Write your answers under the following headings:	*During non-rapid eye movement (NREM), the body releases human growth hormone for the repair and renewal of epithelial and specialised cells such as brain cells.*	0%
22a	1. Non-rapid eye movement (NREM)		
22b	2. Rapid eye movement (REM) and	*Rapid eye movement (REM) sleep appears to be important for cognitive restoration.*	0%
22c	3. Rest.	*Protein synthesis and cell division for the renewal of tissues occur during rest.*	0%
23a	As a registered nurse, what strategies do you use for improving or advising patients regarding sleep, in the hospital in which you work?		
a	Minimise noise/disturbances		35%
b	Minimise Light		25%
c	Deter the use of stimulants		15%
d	Ensure comfort		35%
e	Reduce/eliminate pain		35%
f	Reassure/explain.		35%
g&h	Promote alternative and complementary therapies		10%
i	Include loved ones/familiar items		0%
j	Correct timing of administration of medication		10%
k	Listen to the patient's concerns		10%
l	Promote passive/active exercise during the day		0%
m	Provide adequate nutrition and hydration		10%
n	Promote regular sleep/wake pattern		20%
o	Promote hygiene		25%
p	Provide adequate ventilation		5%
q	Ensure safety of the patient		10%
r	Write/implement a care plan		0%

Summary of pilot study questionnaire scores

The maximum knowledge score obtained out of the 20 pilot study questionnaires was 50% and the minimum knowledge score was 15.5%. The mean was 30.9% (Table E8).

Table E8: Summary of pilot study questionnaire scores

Overall mean score	Maximum score	Minimum score
30.9%	50.0%	15.5%

Comparison between the English and Afrikaans questionnaires (pilot study)

The 18 (90%) English respondents scored a mean of 31.4% for the knowledge section of the questionnaire and the 2 (10%) Afrikaans respondents scored a mean of 26.7% (Table E9)

Table E9: Comparison between the English and Afrikaans questionnaires (pilot study)

Questionnaires	No. of respondents	% of respondents	Mean % score
English	18	90%	31.4%
Afrikaans	2	10%	26.7%

Appendix F: Comparison between the English and Afrikaans knowledge question results for the main study.

Table F1: Comparison between the English and Afrikaans knowledge question results (main study)

Bold question numbers 04-09, 18 and 22 a & b contained the abbreviations REM and NREM with no explanation of the abbreviations in the Afrikaans questionnaire.

Question No.		01	02	03	**04**	**05**	**06**	**07**	**08**	**09**	
Afrikaans	11	90.9%	0%	90.9%	**54.5%**	**9.1%**	**18.2%**	**36.4%**	**36.4%**	**18.2%**	
English	74	93.2%	25.7%	83.8%	**78.4%**	**14.9%**	**17.6%**	**51.4%**	**37.8%**	**27.0%**	
Overall mean score %		92.9%	22.4%	84.7%	**75.3%**	**14.1%**	**17.6%**	**49.4%**	**37.6%**	**25.9%**	
Question No.		10a	10b	10c	10d	10e	10f	10g	10h	10i	10j
Afrikaans	11	72.7%	81.8%	18.2%	18.2%	90.9%	9.1%	27.3%	27.3%	27.3%	100.0%
English	74	67.6%	77.0%	43.2%	12.2%	91.9%	17.6%	33.8%	32.4%	48.6%	98.6%
Overall mean score %		68.2%	77.6%	40.0%	12.9%	91.8%	16.5%	32.9%	31.8%	45.9%	98.8%
Question No.		11	12	13	14	15	16	17	**18**	19	20
Afrikaans	11	72.7%	90.9%	18.2%	27.3%	100.0%	90.9%	18.2%	**36.4%**	27.3%	9.1%
English	74	56.8%	90.5%	8.1%	28.4%	81.1%	83.8%	37.8%	**37.8%**	10.8%	29.7%
Overall mean score %		58.8%	90.6%	9.4%	28.2%	83.5%	84.7%	35.3%	**37.6%**	12.9%	27.1%
Question No.		21a	21b	21c	21d	21e	21f	21g	21h	21i	
Afrikaans	11	72.7%	100.0%	0%	18.2%	63.6%	36.4%	0%	27.3%	0%	
English	74	67.6%	98.6%	2.7%	17.6%	63.5%	23.0%	6.8%	35.1%	1.4%	
Overall mean score %		68.2%	98.8%	2.4%	17.6%	63.5%	24.7%	5.9%	34.1%	1.2%	
Question No.		**22a**	**22b**	22c	23a	23b	23c	23d	23e	23f	23g&h
Afrikaans	11	**0%**	**0%**	0%	81.8%	72.7%	9.1%	63.6%	45.5%	27.3%	18.2%
English	74	**2.7%**	**0%**	2.7%	78.4%	55.4%	13.5%	55.4%	41.9%	36.5%	12.2%
Overall mean score %		**2.4%**	**0%**	2.4%	78.8%	57.6%	12.9%	56.5%	42.4%	35.3%	12.9%
Question No.		23i	23j	23k	23l	23m	23n	23o	23p	23q	23r
Afrikaans	11	0%	9.1%	9.1%	0%	9.1%	0%	36.4%	9.1%	0%	0%
English	74	4.1%	8.1%	5.4%	5.4%	13.5%	13.5%	12.2%	5.4%	5.4%	0%
Overall mean score %		3.5%	8.2%	5.9%	4.7%	12.9%	11.8%	15.3%	5.9%	4.7%	0%

Table F2: Summary of the results in Table F1

Summary	**Mean correct score** %
Afrikaans (11)	35.0%
English (74)	36.3%
Total (85)	36.1%

Appendix G: Information sheet in English.

INFORMATION LETTER APPLICABLE TO THE RESEARCH QUESTIONNAIRE: A SURVEY OF NURSES' KNOWLEDGE OF SLEEP AND ITS ROLE IN PATIENT RECOVERY IN A HOSPITAL CONTEXT

This research study is undertaken in partial fulfilment of the degree, Master of Science in Nursing (AHS5024W), Health Sciences Department at the University of Cape Town. If you require further information regarding this study please contact the researcher Marisa Pinna at mmpinna@yahoo.com or at 076 9798374. The supervisors are Doctor P Mayers and Assoc Professor S Clow. In the event of the researcher not being available or able to answer any questions, the supervisors of this research can be contacted at 021 4066464 and 021 4066449 respectively. The senior secretary at the Faculty of Health Sciences Human Research Ethics Committee of the University of Cape Town's contact details are 021 4066492.

The purpose of this research project is to conduct a survey of nurses' knowledge of sleep and its role in patient recovery in a hospital context. Approval to conduct the above specified research has been obtained from the Faculty of Health Sciences Human Research Ethics Committee of the University of Cape Town (HREC REF: 397/2010), as well as the relevant private hospital group. Approval for access to the nursing staff has been obtained from the private hospital group Ethics Committee and the Nursing Manager of the single applicable hospital.

The questionnaire consists of three short sections: section A sleep knowledge; section B demographic profile and section C professional profile. The knowledge section consists of questions on anatomy; physiology, applicable nursing care and patient education. Informed consent will be sought from the participants by way of a returned questionnaire, with no coercion or threats and confidentiality will be rigorously maintained. The researcher will observe the participant completing the questionnaire individually or in groups, according to the participants' preference. The questionnaire is unlikely to take more than 20 minutes to complete. After completion of the attached questionnaire, place the questionnaire and this information letter into the self-sealing envelope provided and hand the envelope immediately to the researcher. Completed questionnaires may not be withdrawn or altered once they have been received by the researcher.

The correct answers to the questions in the questionnaire will be given to the Nursing Manager by the researcher within two weeks of the collection and collation of all of the questionnaires. The Nursing Manager will then disseminate the answers to the questions in the questionnaire to all of the participants via the Unit Managers. The completed questionnaires will be used and stored confidentially by the researcher. A statistician will assist the researcher as required in a confidential manner.

The risks and benefits of participation in this study.

No physical tests or experiments will be carried out in this research. The risks in this research have been minimised with the emphasis on benefits and the selection of participants is equitable. Participation is highly unlikely to have any detrimental or immediate beneficial effects on any participant's ability to carry out her usual responsibilities. All information obtained via the questionnaire will not be used to judge the participant and will not be individually identifiable. Participation in this research will not interrupt patient care or work duties if the participants agree to use their break time or their own time before or after work. If not, the researcher will consult the Nursing Manager, in order to make alternative arrangements. No remuneration will be offered although non-alcoholic refreshments will be provided. In the final research report, all information will be converted into figures and graphs with the relevant explanation, after having been statistically analysed with a computer programme.

The research findings will be used to provide targeted information to assist nurses in providing quality nursing care for patients. Future in-service training at your hospital can be organised by the resident Learning and Development Consultant to include the importance of uninterrupted sleep as a contributory factor to the recovery of patients, in consultation with the Nursing Manager. Nurses' awareness of the benefits of uninterrupted sleep will serve to influence their role in enabling improved conditions in a hospital setting, in order to promote patient healing in a hospital context. The participants who are nurses will not benefit from participating in this research, other than that it may initiate an interest in knowledge of sleep. Participation in this research will be voluntary merely in an effort to be helpful and will be greatly appreciated by the researcher. There will be no adverse consequences for not completing the attached questionnaire. This research will assist the researcher in identifying the nurses' knowledge of sleep and its role in patient

recovery at this specific hospital. A larger national study could possibly contribute to the reformation of the current nursing curricula, in the future.

Appendix H: Information sheet in Afrikaans.

TOEPASLIKE INLIGTINGS BRIEF BETREFFENDE DIE NAVORSINGS VRAELYS: 'N ONDERSOEK NA VERPLEEGSTERS SE KENNIS VAN SLAAP EN DIE ROL WAT DIT SPEEL IN DIE PASIËNT SE HERSTEL BINNE DIE HOSPITAAL KONTEKS

Hierdie navorsing word onderneem as 'n gedeeltelike voltooing van die graad, Magister in Gesondheidswetenskappe in Verpleegkunde (AHS5024W), aan die Universiteit van Kaapstad. Indien U meer inligting verlang in verband met hierdie studie moet U asseblief met die navorser Marisa Pinna in verbinding tree per epos mmpinna@yahoo.com of deur 076 9798374 te skakel. Die toesighouers is Dr P Mayers en Mede-Prof S Clow. Indien die navorser nie in staat of beskikbaar is om enige vrae te beantwoord nie, kan U met die toesighouers in verbinding tree deur onderskeidelik 021 4066464 en 021 4066449 te skakel. Die senior sekretaresse by die Fakulteit Gesondheidswetenskappe, Menslike Navorsings Etiese Komitee aan die Universiteit van Kaapstad, se kontak nommer is 021 4066492.

Die doel van hierdie navorsings projek is om ondersoek in te stel na verpleegsters se kennis van slaap en die rol wat dit speel in die pasiënt se herstel binne die hospitaal konteks. Toestemming om bogenoemde gespesifiseerde navorsing uit te voer, is verkry van die Fakulteit van Gesondheidswetenskappe Menslike Navorsings Etiese Komitee van die Universiteit van Kaapstad (Verwysings nommer 397/2010), so wel as die toepaslike privaat hospitaal groep. Toestemming tot beskikbaarheid van die verpleeg personeel is verkry van die hospitaal groep se etiese komitee en die verpleegbestuurder van die enkele toepaslike hospitaal.

Die vraelys bestaan uit drie kort afdelings: afdeling A slaap kennis; afdeling B demografiese profiel en afdeling C professionele profiel. Die slaap kennis afdeling bestaan uit vrae oor anatomie, fisiologie, toepaslike verpleegsorg en pasiënt opleiding. Ingeligte toestemming, sonder dwang of dreigemente, sal van die deelnemers verkry word deur 'n terugbesorgde vraelys en geheimhouding sal streng gehandhaaf word. Die navorser sal die deelnemer/s individueel of in groepe monitor soos hulle dit verkies. Dit is onwaarskynlik dat dit langer as 20 minute sal neem om die vraelys te voltooi. Na voltooing van die aangehegte vraelys moet die vraelys, en die inligtingsbrief in die selfverseëlende koevert wat voorsien sal word, geplaas word en onmiddelik aan die navorser oorhandig word.

Voltooide vraelyste mag nie teruggetrek of verander word nadat dit by die navorser ingehandig is nie.

Die korrekte antwoorde op die vrae in die vraelys sal binne twee weke, nadat alle vraelyste opgetel en gekollasioneer is, aan die Verpleegbestuurder besorg word. Die Verpleegbestuurder sal die korrekte antwoorde aan die Eenheidsbestuurders oordra. Die Eenheidsbestuurders sal die aantwoorde aan die deelnemers oordra. Die navorser sal die voltooide vraelyste vertroulik gebruik en berg. 'n Statistikus sal die navorser vertroulik bystaan soos benodig.

Die risikos en voordele van deelname aan hierdie studie

Geen fisiese toetse of eksperimente sal gedurende hierdie navorsing uitgevoer word nie. Die risikos gedurende hierdie navorsing is geminimaliseer met die klem op die voordele en die onpartydige kies van deelnemers. Deelname sal hoogswaarskynlik geen nadelige of onmiddellike voordelige effek hê op die deelnemers se vemoë om hulle normale verantwoordelikhede uit te voer nie. Al die inligting wat deur die vraelyste verkry word, sal nie gebruik word om die deelnemers te oordeel en sal ook nie individueel herkenbaar wees nie. Deelname sal ook nie die pasiëntsorg onderbreek nie as die deelnemers saamstem om hul rustyd of hul eie tyd voor of na werk te gebruik nie. So nie, sal die navorser met die Verpleegbestuurder onderhandel vir 'n alternatiewe geskikte tyd. Daar is geen vergoeding nie, maar nie-alkoholiese verversings sal verskaf word. In die finale navorsingsrapport sal die inligting verwerk word tot syfers en grafieke met toepaslike verduidelikings nadat dit deur 'n rekenaarsprogram statisties ontleed is.

Die bevindings van die navorsing sal gebruik word om geteikende inligting aan verpleegsters te verskaf om hulle by te staan om kwaliteit sorg aan die pasiënt te gee. Afhangende van die resultaat van hierdie navorsing kan die belangrikheid van slaap as 'n bydraende faktor in die herstel van pasiënte in toekomstige in diens opleiding in U hospitaal gebruik word. Die plaaslike Leer en Ontwikkelings Konsultant, in samewerking met die Verpleegbestuurders sal hier 'n belangrike rol speel. Die verpleegster se bewustheid van die voordele van ononderbroke slaap sal hulle in staat stel om beter toestande te skep om pasiënt herstel binne die hospitaal te bevorder. Deelnemers, wat verpleegsters is, sal nie voordeel trek uit deelname nie, maar dit kan hulle belangstelling in die kennis van slaap aanwakker. U vrywillige deelname aan hierdie navorsing is van groot hulp vir die navorser en word regtig waardeer. Daar sal geen nadelige gevolge wees as die

vraelys nie ingevul is nie. Die navorsing sal die navorser bystaan om die verpleegsters se kennis van slaap en die rol wat dit speel in pasiënt herstel by hierdie spesifieke hospitaal te identifiseer. 'n Groter nasionale studie kan dalk bydra aan die hervorming van die verpleeg opleidings kurrikulum in die toekoms.

Vertaal van Engels tot Afrikaans deur Mnr. J. Top.

Geredigeer deur Mev. V. Chaplin.

Appendix I: Questionnaire in English.

A SURVEY OF NURSES' KNOWLEDGE OF SLEEP AND ITS ROLE IN PATIENT RECOVERY IN A HOSPITAL CONTEXT

RESEARCH QUESTIONNAIRE

INSTRUCTIONS

1. Please answer **all of the questions without consulting anyone and without referring to any form of information source.** Mark your choice with a tick (√).
   e.g. Are you a Nurse?
   - ☐ No
   - ☑ Yes
   - ☐ Unsure
2. Only one option per question is permissible unless specifically specified.
3. This is not an exam. **It is however important that you answer the questions honestly from memory without guessing.**
4. **Please ensure that your answers are clearly written or ticked on the questionnaire.**
5. If you want to change anything that you have written down, you may do so by deleting the incorrect information by crossing it out and initialling the change and rewriting the information that you want to provide.
6. The questionnaire consists of **4 double-sided pages** which includes the information letter.

Your voluntary participation in this study will be confirmed by returning a completed questionnaire to the researcher.

SECTION A: SLEEP		
	KNOWLEDGE	FOR OFFICIAL USE
	Please indicate your answer to the questions below by marking your choice with a tick, inside the box next to your answer of choice.	
01	Is uninterrupted sleep a major contributory factor for health? ☐ No ☐ Yes ☐ Unsure	
02	What are Circadian rhythms relating to sleep? Choose one correct answer. ☐ Circadian rhythms follow an approximate 12 hour cycle through a complex process linked to light and dark. ☐ Circadian rhythms take place as an approximate 24 hour cycle through a complex process linked to light and dark. ☐ Circadian rhythms are more or less 12 hour cycles of behaviour and physiology that are generated by endogenous biological clocks. ☐ Unsure	

	Please indicate your answer to the questions below by marking your choice with a tick, inside the box next to your answer of choice.	FOR OFFICIAL USE
03	The autonomic nervous system (ANS) regulates the vital functions of internal homeostasis and is composed of the sympathetic nervous system and parasympathetic nervous system. ☐ False ☐ True ☐ Unsure	
04	Normal human sleep consists of two states known as non-rapid eye movement (NREM) sleep and is followed by rapid eye movement (REM) sleep. ☐ False ☐ True ☐ Unsure	
05	Non-rapid eye movement (NREM) sleep is divided into two stages. ☐ False ☐ True ☐ Unsure	
06	Rapid eye movement (REM) sleep is divided into four stages. ☐ False ☐ True ☐ Unsure	
07	Rapid eye movement (REM) sleep is a phase which is not associated with dreaming. ☐ False ☐ True ☐ Unsure	
08	The combined non-rapid eye movement (NREM) and rapid eye movement (REM) sleep cycle occurs about every 90 min and reoccurs four to six times per average sleep episode in the young adult. ☐ False ☐ True ☐ Unsure	
09	During which phase of sleep has total loss of muscle tone (atonia) been found to occur in humans? ☐ Non-rapid eye movement ☐ Rapid eye movement ☐ Unsure	

	Please indicate your answer to the questions below by marking your choice with a tick, inside the box next to your answer of choice.	FOR OFFICIAL USE
10	Which of the following health disorders can be initiated or increased by regularly disturbed sleep? Several options may be applicable. ☐ Psychiatric disorders ☐ Compromised concentration ☐ Obesity ☐ Cancer ☐ Depression ☐ Diabetes Mellitus ☐ Metabolic Syndrome ☐ Cardiovascular disease ☐ Altered immune response ☐ Down Syndrome (Trisomy 21)	
11	Does primary snoring fall within the scope of sleep disorders? ☐ No ☐ Yes ☐ Unsure	
12	Is obstructive sleep apnoea associated with an increased risk of poor health and death? ☐ No ☐ Yes ☐ Unsure	
13	Circadian rhythms in humans, including sleep-wake cycles, are initiated by the suprachiasmatic nucleus (SCN). In which part of the brain is the suprachiasmatic nucleus located? ☐ Posterior hypothalamus ☐ Anterior hypothalamus ☐ Unsure	
14	Which environmental factor mainly influences the secretion of the pineal hormone, Melatonin? ☐ Light ☐ Darkness ☐ Unsure	
15	Variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors. ☐ False ☐ True ☐ Unsure	

	Please indicate your answer to the questions below by marking your choice with a tick, inside the box next to your answer of choice.	FOR OFFICIAL USE
16	In the older adult deterioration of sleep patterns results in fragmented sleep at night, with increased sleepiness and sleep during the day. ☐ False ☐ True ☐ Unsure	
17	The two-process model suggests that the timing of sleep and waking is determined by the interaction between process S (dependent on duration of prior sleep and waking) and process C (circadian process). ☐ False ☐ True ☐ Unsure	
18	Newborn sleep is divided into rapid eye movement (REM) sleep, non-rapid eye movement (NREM) sleep and indeterminate sleep. ☐ False ☐ True ☐ Unsure	
19	The newborn sleep cycle is on average 120 minutes. ☐ False ☐ True ☐ Unsure	
	Fill in your answers to the questions below on the lines provided.	
20	What is the physiological function of Melatonin in humans concerning sleep?	
21	List as many environmental factors as possible within the hospital context which unnecessarily cause patients to have interrupted sleep.	

	Fill in your answers to the questions below on the lines provided.	FOR OFFICIAL USE
22	What is the physiological function of each of the following with respect to patient recovery in a hospital context?	
22a	Non-rapid eye movement (NREM)	
22b	Rapid eye movement (REM)	
22c	Rest	
23	As a registered nurse, what strategies do you use for improving or advising patients regarding sleep, in the hospital in which you work?	

SECTION B: DEMOGRAPHIC PROFILE		
	DEMOGRAPHIC INFORMATION	FOR OFFICIAL USE
24	What is your age? ..... years	

SECTION C: PROFESSIONAL PROFILE		
	PROFESSIONAL INFORMATION	FOR OFFICIAL USE
	Please indicate your answer to the question below by marking your choice with a tick, inside the box next to your answer of choice.	
25a	What is your current South African Nursing Council (SANC) registration category? ☐ Registered Nurse	
	Fill in your answer to the question below on the line provided.	
25b	If you are not a Registered Nurse, please state your current SANC registration category below.	
	Please indicate your answer/s to the questions below by marking your choice with a tick, inside the box next to your answer of choice	FOR OFFICIAL USE
26	In the last 12 months, in which clinical areas have you worked? ☐ Paediatrics ☐ Medical ☐ Surgical ☐ Maternity ☐ High Care ☐ Intensive Care ☐ Neonatal Intensive Care ☐ Bone Marrow Transplant ☐ Haematology ☐ Other: name of department/s.	
27	Do you work during the day and night or only during the day or only during the night? Tick one option. ☐ Day and night ☐ Day only ☐ Night only	

	Fill in your answer to the question below on the line provided.	FOR OFFICIAL USE
28	How many years of nursing experience (after registration or enrolment with the South African Nursing Council) do you have? .....years	
	Please indicate your answer to the questions below by marking your choice with a tick, inside the box next to your answer of choice.	
29	In your nursing curriculum, did you receive any education specifically relating to sleep? ☐ Yes ☐ No	
30	Since the completion of your nursing training, have you attended any form of education regarding sleep? ☐ No ☐ Yes ☐ Unsure	

Thank you for your willingness to participate in this study.

Appendix J: Questionnaire in Afrikaans.

'N ONDERSOEK NA VERPLEEGSTERS SE KENNIS VAN SLAAP EN DIE ROL WAT DIT SPEEL IN DIE PASIËNT SE HERSTEL BINNE DIE HOSPITAAL KONTEKS

NAVORSING VRAELYS

INSTRUKSIES

1. Antwoord asseblief **all die vrae sonder om enige iemand te raadpleeg en sonder verwysing na enige inligtingsbron.** Merk U keuse met 'n (√).
   Bv: Is U 'n registreerde verpleegkundige?

   ☐ Nee
   ☑ Ja
   ☐ Onseker

2. Slegs een keuse per vraag is toelaatbaar, tensy anders gespesifiseer.
3. Hierdie is nie 'n eksamen nie. **Dit is egter belangrik dat U die vrae eerlik beantwoord met U eie kennis en dat U nie raai nie.**
4. **Maak seker dat U antwoorde duidelik geskryf of gemerk is op die vraelys.**
5. As u iets wil verander wat u geskryf het, moet U 'n streep trek deur die antwoord, en teken by die verandering. Skryf dan die korrekte antwoord neer.
6. Die vraelys bestaan uit 4 dubbel eensydige bladsye insluitend die inligtingsbrief.

U willekeurige deelname aan hierdie studie sal bevestig word as u die voltoeide vraelys aan die navorser indien.

AFDELING A: SLAAP		
	KENNIS	VIR AMPTELIKE GEBRUIK
	Dui asseblief U antwoord op die vrae hieronder aan deur U keuse te merk met 'n (√), binne-in die blokkie langs U keuse.	
01	Is ononderbroke slaap 'n belangrike bydraende faktor vir gesondheid? ☐ Ne ☐ Ja ☐ Onseker	
02	Wat is Sirkadiese ritmes rakende slaap? Kies een korrekte antwoord. ☐ Sirkadiese ritmes volg 'n benaderde 12 uur siklus deur 'n komplekse proses verbind aan lig en donker. ☐ Sirkadiese ritmes vind plaas as 'n benaderde 24 uur siklus deur 'n komplekse proses verbind aan lig en donker. ☐ Sirkadiese ritmes is ongeveer 12 uur siklusse van gedrag en fisiologie wat gegenereer word deur endogene biologiese klokke. ☐ Onseker	

	Dui asseblief U antwoord/e op die vrae hieronder aan deur U keuse te merk met 'n (√)*, binne-in die blokkie langs U keuse.*	VIR AMPTELIKE GEBRUIK
03	Die outonome senuwee stelsel (ONS) reguleer die lewensbelangrike funksies van die interne homeostase en is saamgestel uit die simpatiese senuwee stelsel en die parasimpatiese senuwee stelsel. ☐ Onwaar ☐ Waar ☐ Onseker	
04	Normale menslike slaap bestaan uit twee dele bekend as NREM slaap en word gevolg deur REM slaap. ☐ Onwaar ☐ Waar ☐ Onseker	
05	NREM slaap word verdeel in twee stadiums. ☐ Onwaar ☐ Waar ☐ Onseker	
06	REM slaap word verdeel in vier stadiums. ☐ Onwaar ☐ Waar ☐ Onseker	
07	REM slaap is 'n fase wat nie geassosieer word met droom nie. ☐ Onwaar ☐ Waar ☐ Onseker	
08	Die gekombineerde NREM en REM slaap siklus kom ongeveer elke 90 min voor en word vier tot ses keer per gemiddelde slaap episode in die jong volwassene herhaal. ☐ Onwaar ☐ Waar ☐ Onseker	
09	Gedurende watter fase van slaap word totale verlies van spiertonus by mense ondervind? ☐ NREM ☐ REM ☐ Onseker	

	Dui asseblief U antwoorde op die vrae hieronder aan deur U keuse te merk met 'n (√)*, binne-in die blokkie langs U keuse.*	VIR AMPTELIKE GEBRUIK
10	Watter van die volgende gesondheids probleme kan begin of vererger word deur onderbroke slaap? Verskeie opsies is moontlik. ☐ Psigiatriese toestande ☐ Gecompromiseerde konsentrasie ☐ Vet ☐ Kanker ☐ Depressie ☐ Diabetes Mellitus ☐ Metaboliese Sindroom ☐ Kardiovaskulêre Siekte ☐ Veranderlike Immuun Respons ☐ Down Sindroom (Trisomie 21)	
11	Resorteer snork binne die spektrum van slaap siektes? ☐ Nee ☐ Ja ☐ Onseker	
12	Word Obstruktiewe Slaap-apnee verbind met 'n verhoogde risiko van swak gesondheid en die dood? ☐ Nee ☐ Ja ☐ Onseker	
13	Sirkadiese ritmes in mense, insluitend slaap-wakker siklusse, word geinisieer van die Suprachiasmatiese Nukleus (SCN). In watter deel van die brein is die Suprachiasmatiese Nukleus geleë? ☐ Agter hipothalamus ☐ Voor hipothalamus ☐ Onseker	
14	Watter omgewings faktor beinvloed hoofsaaklik die sekresie van die pineale hormoon, Melatonin? ☐ Lig ☐ Donker ☐ Onseker	
15	Verskille in slaap vooreistes vir gesonde volwassenes word beinvloed deur omgewing, geneties en sosiale faktore. ☐ Onwaar ☐ Waar ☐ Onseker	

	Dui asseblief U antwoord op die vrae hieronder aan deur U keuse te merk met 'n (√)*, binne-in die blokkie langs U keuse.*	VIR AMPTELIKE GEBRUIK
16	By die ouer volwassene word deteriorasie van slaappatrone waargeneem en lei tot gefragmenteerde slaap in die nag, met verhoogte slaaperigheid en slaap gedurende die dag. ☐ Onwaar ☐ Waar ☐ Onseker	
17	Die twee proses model stel voor dat die tydsberekening van slaap en wakker word bepaal deur die interaksie tussen proses S (afhanklik van duur van vorige slaap en wakker word), en proses C (sirkadiese proses). ☐ Onwaar ☐ Waar ☐ Onseker	
18	Babas se slaap word verdeel in REM slaap, NREM slaap en onbepaalde slaap. ☐ Onwaar ☐ Waar ☐ Onseker	
19	Nuwe babas se slaap siklus is gemiddeld 120 minute. ☐ Onwaar ☐ Waar ☐ Onseker	
	Vul U antwoorde op die vrae hieronder in op die lyne wat voorsien word.	
20	Wat is die fisiologiese funksie van Melatonin in mense, betreffende slaap?	
21	Lys so veel as moontlik van die omgewings faktore binne in die hospitaal wat onnodiglik pasiënte onderbroke slaap laat ervaar.	

	Vul U antwoorde op die vrae hieronder in op die lyne wat voorsien word.	VIR AMPTELIKE GEBRUIK
22	Wat is die fisiologiese funksie van elkeen van die volgende, met betrekking tot pasiënt se herstel in 'n hospitaal konteks?	
22a	NREM slaap	
22b	REM slaap	
22c	Rus	
23	Watter strategieë sal U as verpleegkundige gebruik om pasiënte beter in te lig en beter te laat slaap, in die hospitaal waar U werk?	

AFDELING B: DEMOGRAFIESE PROFIEL		
	DEMOGRAFIESE INLIGTING	VIR AMPTELIKE GEBRUIK
24	Wat is U ouderdom? ..... jaar	

AFDELING C: PROFESSIONELE PROFIEL		
	PROFESSIONELE INLIGTING	VIR AMPTELIKE GEBRUIK
	Dui asseblief U antwoord op die vraag onder aan deur U keuse te merk met 'n (√), *binne-in die blokkie langs U keuse.*	
25a	Wat is U huidige Suid Afrikaanse Verpleegkundige Raad registrasie kategorie? ☐ Geregistreerde Verpleegkundige	
	Vul U antwoord op die vraag hieronder in op die lyn wat voorsien is.	
25b	As U **nie** 'n registreerde verpleegkundige is, skryf asseblief U kategorie op die lyn onder.	
	Dui asseblief U antwoord op die vrae hieronder aan deur U keuse te merk met 'n (√), *binne-in die blokkie langs U keuse.*	VIR AMPTELIKE GEBRUIK
26	In watter kliniese area het U vir meer as 6 maande gewerk geduurende die laaste 12 maande? Kies net een opsie. ☐ Pediatrie ☐ Medies ☐ Chirurgies ☐ Bevallings ☐ Hoë-sorg ☐ Intensiewe sorg ☐ Neonatale Intensiewe sorg ☐ Beenmurg oorplanting ☐ Hematologie ☐ Ander: Naam van departement/e	
27	Werk U gedurende die dag en nag of alleenlik gedurende die dag of alleenlik gedurende die nag? ☐ Dag en nag ☐ Dag alleen ☐ Nag alleen	

	Vul U antwoord op die vraag hieronder in op die lyn wat voorsien is.	VIR AMPTELIKE GEBRUIK
28	Hoeveel jaar van verpleegkundige ervaring (na registrasie of lidmaatskap by die Suid Afrikaanse Verpleegkundige Raad) het U? .....jare.	
	Dui asseblief U antwoord op die vrae onder aan deur U keuse te merk met 'n (√), *binne-in die blokkie langs u keuse.*	
29	Gedurende U verpleegkundige kurrikulum, het U enige opvoeding spesifiek in verband met slaap ontvang? ☐ Ja ☐ Nee	
30	Na die voltooing van U verpleegkundige opleiding het U enige vorm van opvoedkundige sessie bygewoon oor slaap? ☐ Nee ☐ Ja ☐ Onseker	

Vertaal van Engels tot Afrikaans deur Mnr. N. Cronje.

Dankie vir U bereidwilligheid om deel te neem aan hierdie studie.

Appendix K: Correct answers to English questionnaire.

A SURVEY OF NURSES' KNOWLEDGE OF SLEEP AND ITS ROLE IN PATIENT RECOVERY IN A HOSPITAL CONTEXT.

ANSWERS TO KNOWLEDGE SECTION IN QUESTIONNAIRE.

SECTION A: SLEEP		
No.	KNOWLEDGE	
01	Is uninterrupted sleep a major contributory factor for health? ☐ No ☑ Yes ☐ Unsure *Correct answer* Sleep is one of the basic requirements for human life and has been shown to impact on health and healing (Rosenthal, 2009: 11; Patel, Chipman, Carlin & Shade, 2008: 309; Walsh, Dement & Dinges, 2005: 648; Lee & Stotts, 1990: 157). Since the hypothesised core sleep theory the duration of core sleep has subsequently been redefined as 6 - 8 hours of good quality, uninterrupted sleep for most adults (Van Dongen, Rogers & Dinges, 2003: 4). Core sleep has been proven to maintain adequate levels of daytime alertness and cognitive efficacy (Dinges, Rogers & Baynard, 2005: 68; Horne, 1988: 20).	
02	What are Circadian rhythms relating to sleep? Choose one correct answer. ☐ Circadian rhythms follow an approximate 12 hour cycle through a complex process linked to light and dark. ☑ Circadian rhythms take place as an approximate 24 hour cycle through a complex process linked to light and dark. ☐ Circadian rhythms are more or less 12 hour cycles of behaviour and physiology that are generated by endogenous biological clocks. ☐ Unsure *Correct answer* Rosenthal (2009: 11), Mathew (2008) and Mistlberger and Rusak (2005: 321) explain that circadian rhythms are on average 24-hour cycles of behaviour and physiology, which are generated by endogenous biological clocks through a complex process linked to light and dark. Vitaterna, Pinto and Turek (2005: 363) explain that circadian rhythms can be produced by single cells in a self-sustaining manner. These rhythms occur due to coordinated daily oscillations in the levels of various clock component proteins.	

03	The autonomic nervous system (ANS) regulates the vital functions of internal homeostasis and is composed of the sympathetic nervous system and parasympathetic nervous system. ☐ False ☑ True ☐ Unsure *Correct answer* "The autonomic nervous system (ANS) regulates the vital functions of internal homeostasis. The ANS is composed of the sympathetic nervous system and parasympathetic nervous system" (Rama, Cho & Kushida, 2009: 4; Rosenthal, 2009: 12).	
04	Normal human sleep consists of two states known as non-rapid eye movement (NREM) sleep and is followed by rapid eye movement (REM) sleep. ☐ False ☑ True ☐ Unsure *Correct answer* Normal human sleep consists of two distinct states, known as non-rapid eye movement (NREM) and is followed by rapid eye movement (REM) sleep (Rama *et al*., 2009: 1; Carskadon & Dement, 2005: 18).	
05	Non-rapid eye movement (NREM) sleep is divided into two stages. ☑ False ☐ True ☐ Unsure *Correct answer* Non-rapid eye movement (NREM) sleep was previously classified into four stages, although has recently been reclassified into three stages: N1, N2, N3 (Rama *et al*., 2009: 1).	
06	Rapid eye movement (REM) sleep is divided into four stages. ☑ False ☐ True ☐ Unsure *Correct answer* Rapid eye movement sleep is divided into two stages: phasic and tonic (Marks, 2009: 9).	

07	Rapid eye movement (REM) sleep is a phase which is not associated with dreaming. ☑ False ☐ True ☐ Unsure *Correct answer* Rapid eye movement (REM) sleep has been found to be associated with dreaming in humans (Tippmann-Peikert, Morgenthaler, Boeve & Silber, 2009: 141; Carskadon & Dement, 2005: 14; Domhoff, 2005: 524); Siegel, 2005: 120.	
08	The combined non-rapid eye movement (NREM) and rapid eye movement (REM) sleep cycle occurs about every 90 min and reoccurs four to six times per average sleep episode in the young adult. ☐ False ☑ True ☐ Unsure *Correct answer* The non-rapid eye movement – rapid eye movement (NREM-REM) sleep cycle, takes place on average every 90 minutes and approximately four to six times per average sleep episode (Rama *et al*., 2009: 1; Dement, 2005: 15).	
09	During which phase of sleep has total loss of muscle tone (atonia) been found to occur in humans? ☐ Non-rapid eye movement ☑ Rapid eye movement ☐ Unsure *Correct answer* Total loss of muscle tone (atonia) occurs in humans during the active rapid eye movement (REM) phase of sleep (Rama *et al*., 2009: 1; Chase & Morales, 2005: 154; Mahowald & Schenck, 2005: 962; Horne, 1988: 142; Kleitman, 1963: 3).	

10	Which of the following health disorders can be initiated or increased by regularly disturbed sleep? Several options may be applicable. ☑ 10a. Psychiatric disorders ☑ 10b. Compromised concentration ☑ 10c. Obesity ☑ 10d. Cancer ☑ 10e. Depression ☑ 10f. Diabetes Mellitus ☑ 10g. Metabolic Syndrome ☑ 10h. Cardiovascular disease ☑ 10i. Altered immune response ☐ 10j. Down Syndrome (Trisomy 21) *Correct answer* Research has shown that chronic interruption of sleep can initiate or increase the incidence of psychiatric disorders (Edinger & Means, 2005: 706), compromised concentration (Edinger & Means, 2005: 707), obesity (Young, 2008: 593; Dinges, Rogers & Baynard, 2005: 74), cancer (Kakizaki *et al*., 2008: 1502), depression (Taylor, 2008: 448; van de Glind, de Roode & Goossensen, 2007: 158; Edinger & Means, 2005: 706), diabetes mellitus (Walsh, Dement & Dinges, 2005: 650), metabolic syndrome (Javaheri, 2005: 1158), cardiovascular disease (Palmer, 2008: 1; Dinges, Rogers & Baynard, 2005: 74; Somers & Javaheri, 2005: 1180; Walsh, Dement & Dinges, 2005: 649) and altered immune response (Krueger & Majde, 2009: 223; Dinges *et al.*, 2005: 73). There is no scientific evidence that Down syndrome can be initiated or increased by regularly disturbed sleep. Down syndrome (Trisomy 21) is a chromosomal disorder resulting in mental retardation and physical abnormalities (Liptak, 2008: 1).	
11	Does primary snoring fall within the scope of sleep disorders? ☐ No ☑ Yes ☐ Unsure *Correct answer* Mehra & Strohl (2009: 73) and Mathew (2008) concur that primary snoring, as tabled in the International Classification of Sleep Disorders falls within the scope of sleep disorders. Vaughn & D'Cruz (2005: 596) state that snoring is a cardinal manifestation of a sleep disorder.	

12	Is obstructive sleep apnoea associated with an increased risk of poor health and death? ☐ No ☑ Yes ☐ Unsure *Correct answer* Obstructive sleep apnoea is common and can result in significant morbidity and mortality (Hahn, Olson & Somers, 2009: 95; Phillips & Kryger, 2005: 1109).	
13	Circadian rhythms in humans, including sleep-wake cycles, are initiated by the suprachiasmatic nucleus (SCN). In which part of the brain is the suprachiasmatic nucleus located? ☐ Posterior hypothalamus ☑ Anterior hypothalamus ☐ Unsure *Correct answer* Circadian rhythms in mammals, including sleep-wake cycles, are endogenously driven by the suprachiasmatic nucleus (SNC) in the anterior hypothalamus (Rosenthal, 2009: 11; Gooley & Saper, 2005: 335; Turek, Dugovic & Laposky, 2005: 318).	
14	Which environmental factor mainly influences the secretion of the pineal hormone, Melatonin? ☐ Light ☑ Darkness ☐ Unsure *Correct answer* The hormone melatonin is secreted by the pineal gland, primarily during the hours of darkness in all humans (Arendt, Stone & Skene, 2005: 664; Scheer, Cajochen, Turek & Czeisler, 2005: 395).	

15	Variances in sleep requirements for healthy adults are influenced by environmental, genetic and social factors. ☐ False ☑ True ☐ Unsure *Correct answer* Epidemiological and experimental studies point to a high variance in sleep duration for healthy adults, which are influenced by environmental, genetic and societal factors (Dinges, Rogers & Baynard, 2005: 68).	
16	In the older adult deterioration of sleep patterns results in fragmented sleep at night, with increased sleepiness and sleep during the day. ☐ False ☑ True ☐ Unsure *Correct answer* There is a reorganisation of sleep around the 24-hour day in the older adult, with intermittent night-time awakenings and an increase in daytime napping (Ayalon & Ancoli-Israel, 2009: 173; Ancoli-Israel, 2004: 37).	
17	The two-process model suggests that the timing of sleep and waking is determined by the interaction between process S (dependent on duration of prior sleep and waking) and process C (circadian process). ☐ False ☑ True ☐ Unsure *Correct answer* The two-process model posits that "the timing of sleep and waking is determined by the interaction between process S and process C. Sleep onset is thought to occur when both the homeostatic (process S) and circadian drive (process C) of sleep intersect" (Rama *et al*., 2009: 4; Turek, Dugovic & Laposky, 2005: 319).	

18	Newborn sleep is divided into rapid eye movement (REM) sleep, non-rapid eye movement (NREM) sleep and indeterminate sleep. ☐ False ☑ True ☐ Unsure *Correct answer* Sleep in newborns is divided into rapid eye movement sleep (REM), non-rapid eye movement sleep (NREM) sleep and indeterminate sleep (Rama *et al*., 2009: 2).	
19	The newborn sleep cycle is on average 120 minutes. ☑ False ☐ True ☐ Unsure *Correct answer* The newborn sleep cycle is about 60 minutes (Rama *et al*., 2009: 2). The sleep cycle gradually increases from 6 months of age to the adult average of 90 minutes (Rama *et al*., 2009: 2)	
20	What is the physiological function of Melatonin in humans concerning sleep? *Correct answer* According to Lee-Chiong and Sateia (2009: 39); Gooley and Saper (2005: 335, 345) and Scheer, Cajochen, Turek, and Czeisler (2005: 398), melatonin is a hormone which has been shown to promote sleep in humans.	
21	List the environmental factors within the hospital which unnecessarily cause patients to have interrupted sleep. Lei *et al*. (2008) identified the following factors affecting nocturnal sleep of inpatients: noise; nursing disturbance; discomfort relating to disease process; micturition; defecation; medication; missing relatives; boredom and lack of self control. Bonnet (2005) and Morin (2005) do not refer to a hospital environment, although suggesting various environmental factors which may cause interrupted sleep. Some of the factors are listed below, although the lack of hygiene is not included. *Potential correct answers* • Light: bright/unfamiliar lighting (Friese, 2008; Doğan *et al*., 2005; Walder, Francioli, Meyer, Lançon & Romand, 2000; Southwell & Wistow, 1995; Hilton, 1976). • Noise/disturbance: medication rounds, doctor's rounds, nurses rounds, other patients, telephones, equipment, building work outside, visitors (Lei *et al*., 2009; Friese, 2008; Doğan *et al*., 2005; Cmiel *et al*., 2004; Frisk & Nordström, 2003; Freedman, Gazendam, Levan, Pack & Schwab, 2001; Walder *et al*., 2000; Southwell & Wistow, 1995).	

	• Inadequate analgesia: pain infers inadequate analgesia (Lei *et al*., 2009; Friese, 2008; Patel *et al*., 2008; Frisk & Nordström, 2003:; Southwell & Wistow, 1995). • Medication: insomnia inducing medications and insomnia creating side effects, the incorrect timing of the administration of sleeping tablets (Friese, 2008; Patel *et al*., 2008; Berlin, 1984). • Discomfort: inadequate ventilation; inadequate nutrition and/or hydration (hunger and thirst); uncomfortable/strange bed; pillows and bedding; traction; treatment and medication apparatus; failure to empty bladder before sleep; emotional discomfort due to strange environment and routine; anxiety due to lack of physical contact with favourite pet or loved one; lack of hygiene: strange/unpleasant odours, wet/dirty bedding, insects; intravenous therapy; naso-gastric tubes and caffeine diminish sleep (Lei *et al*., 2009; Friese, 2008; Frisk & Nordström, 2003; Fontaine *et al*., 2001). • Environmental temperature: too hot and/or too cold (Doğan *et al*., 2005; Fontaine *et al*., 2001). The respondents' answers to Question 21 were categorised into the following groups for the purposes of collation: 21a) Light; 21b) Noise/disturbance; 21c) Inadequate analgesia; 21d) Incorrect timing of administration of medication, especially insomnia producing medication; 21e) Discomfort; 21f) Environmental temperature and poor ventilation; 21g) Lack of hygiene; 21h) Pain, painful procedures; 21i) Stimulants.	
22	What is the physiological function of each of the following with respect to patient recovery in a hospital context? Write your answers under the following headings: a. non-rapid eye movement (NREM) b. rapid eye movement (REM) and c. rest. <u>*Correct answer*</u> a. <u>Non-rapid eye movement (NREM)</u> During non-rapid eye movement (NREM), the body releases human growth hormone for the repair and renewal of epithelial and specialised cells such as brain cells (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51-57). b. <u>Rapid eye Movement (REM)</u> Rapid eye movement (REM) sleep appears to be important for cognitive restoration (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51-57). c. <u>Rest</u> Protein synthesis and cell division for the renewal of tissues occur during rest (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51-57).	

23	As a registered nurse, what strategies do you use for improving or advising patients regarding sleep, in the hospital in which you work? *Potential correct answers* *Effective elimination of insomnia* Morin (2005: 728) suggests the following strategies for the treatment of primary insomnia in general: • avoid stimulants several hours before retiring to sleep; • avoid the consumption of alcohol imminently before bedtime, as it may cause interrupted sleep; • ensure appropriate passive and active exercise daily; • allow a minimum of 1 hour relaxation before bedtime; • keep the bedroom environment quiet, dark and comfortable at bedtime; • maintain a regular sleep-wake schedule and • remove all bright and dim lighting. Other recommendations according to Mathew (2008) include the following: • implement a care plan related to disturbed sleep pattern; • ensure adequate nutrition (Hodgson, 1991) and • ensure adequate ventilation. Further recommendation in the literature suggest: • cessation of patient activity at the recommended sleep commencement time (Morin, 2005); • allow a patient's loved one to stay beside the patient's bedside at night (Fontaine *et al*., 2001; Berlin, 1984); • take cultural habits into consideration (ensure that every patient has their own comfortable bed as per culture) (Eugene, 2006; Bower, 1999); • patient history should reveal menopausal/pregnancy symptoms (Driver, 2009; Moe, 2005); • allow a favourite pet to visit the patient (Mahoney, 2009; Fontaine *et al*. 2001; Brodie & Biley, 1999; Coakley & Wiley, 1999); • remove all bright and dim lighting (Doğan *et al*., 2005; Fontaine *et al*., 2001; Walder *et al*., 2000; Southwell & Wistow, 1995; Hilton, 1976); • remove mobile phone, computer and television lighting at bed time (Friese, 2008; Morin, 2005); • ensure minimal or preferably no noise (Cmiel *et al*., 2004; Southwell & Wistow, 1995; Stanley-Hermanns & Miller, 2002; Freedman *et al*., 2001; Walder *et al*., 2000); • ensure patient comfort regarding environmental temperature throughout the sleep and rest period (Fontaine *et al*., 2001; Southwell & Wistow, 1995); • ensure hygienic conditions i.e. clean and insect-free mattress, pillows, bedding, bed clothes and surroundings (Fontaine *et al*., 2001); • facilitate recumbent posture with pillows in between or under knees (Caine, 2003); • omit all stimulants for 6 hours before bedtime (Hyde, Roehrs & Roth, 2009);	

- ensure that medication administration times (including medication for pain) facilitates the sleep period (Patel *et al*., 2008; Doğan *et al*., 2005);
- obtain patient buy-in regarding the need for sleep (Bonnet, 2005);
- provide soft, relaxing music according to the patient's preference, if the patient is in a single room (Deshmukh, Sarvaiya, Seethalakshmi & Nayak, 2009; Lai & Good, 2005; Fontaine *et al*., 2001);
- arrange for therapeutic massage (complementary/alternative therapies) with patient's and doctor's permission (Nelson & Coyle, 2010; Nerbass, Feltrim, de Souza, Ykeda & Lorenzo-Filho, 2010; Morin, 2005; Robinson, Weitzel & Henderson, 2005; Fontaine *et al.*, 2001);
- listen to the patient's concerns (Caine, 2003; Fontaine *et al*., 2001; Southwell & Wistow, 1995);
- reassure the patient (Caine, 2003; Southwell & Wistow, 1995);
- explain all planned proceedings (Closs, 1988);
- be kind to the patient/reduce anxiety (Robinson *et al*., 2005; Richards *et al*., 2003);
- include all immediate family members or loved ones in visitations and explanations with the patient's permission (Richards *et al*., 2003; Fontaine *et al*., 2001).

Bonnet (2005: 52) offers evidence related to arousal influences of which the topics include: activity; bright light; noise; temperature; posture; drugs; interest; motivation and repeated periods of sleep loss. It is furthermore suggested that subject characteristics should be taken into consideration. The characteristics include: "genetic tendencies; personality; psychopathology, motivation, interest and age" (Bonnet, 2005: 54).

The strategies were categorised into the following groups for collation purposes:

23a) Minimise noise/disturbances;
23b) Minimise light;
23c) Deter the use of stimulants;
23d) Ensure comfort;
23e) Reduce/eliminate pain;
23f) Reassure/explain;
23g&h) Promote alternative and complementary therapies;
23i) Include loved ones/familiar items;
23j) Correct timing of administration of medication;
23k) Listen to the patient's concerns;
23l) Promote passive/active exercise during the day;
23m) Provide adequate nutrition and hydration;
23n) Promote regular sleep/wake pattern;
23o) Promote hygiene;
23p) Provide adequate ventilation;
23q) Ensure safety of the patient;
23r) Write and implement a care plan.

Appendix L: Correct answers to Afrikaans questionnaire.

'N ONDERSOEK NA VERPLEEGSTERS SE KENNIS VAN SLAAP EN DIE ROL WAT DIT SPEEL IN DIE PASIËNT SE HERSTEL BINNE DIE HOSPITAAL KONTEKS

ANTWOORDE AAN KENNIS AFDELING IN DIE VRAELYS

AFDELING A: SLAAP		
No.	KENNIS	
01	Is ononderbroke slaap 'n belangrike bydraende faktor vir gesondheid? ☐ Nee ☑ Ja ☐ Onseker *Korrekte antwoord:* Slaap is een van die basiese vereistes vir menslike lewe en daar is al gewys watter impak dit het op gesondheid en genesing (Rosenthal, 2009: 11; Patel, Chipman, Carlin & Shade, 2008: 309; Walsh, Dement & Dinges, 2005: 648; Lee & Stotts, 1990: 157). Sedert die veronderstelde kern slaap teorie is die duur van kern slaap vervolgens geherdefinieer as 6-8 ure van goeie kwaliteit, ononderbroke slaap vir meeste volwassenes (Van Dongen, Rogers & Dinges, 2003: 4). Daar is bewys dat kern slaap die vlakke van aandagtigheid en kognitiewe doeltreffendheid bedags in stand hou (Dinges, Rogers & Baynard, 2005: 68; Horne, 1988: 20).	
02	Wat is Sirkadiese ritmes rakende slaap? Kies een korrekte antwoord. ☐ Sirkadiese ritmes volg 'n benaderde 12 uur siklus deur 'n komplekse proses verbind aan lig en donker. ☑ Sirkadiese ritmes vind plaas as 'n benaderde 24 uur siklus deur 'n komplekse proses verbind aan lig en donker. ☐ Sirkadiese ritmes is ongeveer 12 uur siklusse van gedrag en fisiologie wat gegenereer word deur endogene biologiese klokke. ☐ Onseker *Korrekte antwoord:* Rosenthal (2009: 11), Mathew (2008) en Mistlberger en Rusak (2005: 321) verduidelik dat sirkadiese ritmes gemiddeld 24 uur siklusse van gedrag en fisiologie is, wat gegenereer word deur endogeniese biologiese horlosies deur 'n komplekse proses wat aan lig en donker verbind word. Vitaterna, Pinto en Turek (2005: 363) verduidelik weer dat sirkadiese ritmes deur enkel sel in 'n self-onderhoudende manier geproduseer word. Hierdie ritmes vind plaas as gevolg van gekoördineerde daaglikse ossillasie in die vlakke van verskeie horlosie komponent proteïne.	

03	Die outonome senuwee stelsel (ONS) reguleer die lewensbelangrike funksies van die interne homeostase en is saamgestel uit die simpatiese senuwee stelsel en die parasimpatiese senuwee stelsel. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* "Die outonome senuweestelsel (ONS) reguleer die lewensbelangrike/noodsaaklike funksies van interne homeostase. Die (ONS) bestaan uit die simpatiese senuweestelsel en die parasimpatiese senuweestelsel" (Rama, Cho & Kushida, 2009: 4; Rosenthal, 2009: 12).	
04	Normale menslike slaap bestaan uit twee dele bekend as NREM slaap en word gevolg deur REM slaap. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Normale menslike slaap bestaan uit twee afsonderlike toestande, hul staan bekend as NREM slaap en word gevolg deur REM slaap (Rama, Cho & Kushida, 2009: 1; Carskadon & Dement, 2005: 18).	
05	NREM slaap word verdeel in twee stadiums. ☑ Onwaar ☐ Waar ☐ Onseker *Korrekte antwoord:* Alhoewel NREM slaap voorheen in vier stadiums verdeel is, is dit onlangs herklassifiseer in drie stadiums: N1, N2, N3 (Rama en ander, 2009: 1).	
06	REM slaap word verdeel in vier stadiums. ☑ Onwaar ☐ Waar ☐ Onseker *Korrekte antwoord:* REM slaap word verdeel in twee stadia: fasies en tonika (Marks, 2009: 9).	

07	REM slaap is ’n fase wat nie geassosieer word met droom nie. ☑ Onwaar ☐ Waar ☐ Onseker *Korrekte antwoord:* Daar is bevind dat REM slaap in mense geassosieer word met droom (Tippmann-Peikert, Morgenthaler, Boeve & Silber, 2009: 141; Carskadon & Dement, 2005: 14; Domhoff, 2005: 524; Siegel, 2005: 120).	
08	Die gekombineerde NREM en REM slaap siklus kom ongeveer elke 90 min voor en word vier tot ses keer per gemiddelde slaap episode in die jong volwassene herhaal. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Die NREM-REM slaap siklus vind oor die algemeen elke 90 minute plaas en ongeveer vier tot ses keer per gemiddelde slaap episode (Rama en ander, 2009: 1; Dement, 2005: 15).	
09	Gedurende watter fase van slaap word totale verlies van spiertonus by mense ondervind? ☐ NREM ☑ REM ☐ Onseker *Korrekte antwoord*: Totale verlies van spiertonus in mense geskied gedurende die REM fase van slaap (Rama en ander, 2009: 1; Chase & Morales, 2005: 154; Mahowald & Schenck, 2005: 962; Horne, 1988: 142; Kleitman, 1963: 3).	

10	Watter van die volgende gesondheidsprobleme kan begin of vererger word deur onderbroke slaap? Verskeie opsies is moontlik. ☑ 10a. Psigiatriese toestande ☑ 10b. Gekompromiseerde konsentrasie ☑ 10c. Vetsug ☑ 10d. Kanker ☑ 10e. Depressie ☑ 10f. Diabetes Mellitus ☑ 10g. Metaboliese Sindroom ☑ 10h. Kardiovaskulêre Siekte ☑ 10i. Veranderlike Immuun Respons ☐ 10j. Down Sindroom (Trisomie 21) *Korrekte antwoord:* Navorsing wys dat kroniese onderbreking van slaap tot die aanvang en verhoging van psigiatriese toestande/versteurings (Edinger & Means, 2005: 706), gekompromiseerde konsentrasie (Edinger & Means, 2005: 707), vetsug (Young, 2008: 593; Dinges, Rogers & Baynard, 2005: 74), kanker (Kakizaki en ander, 2008: 1502-1505), depressie (Taylor, 2008: 448; van de Glind, de Roode & Goossensen, 2007: 158; Edinger & Means, 2005: 706), diabetes mellitus (Walsh, Dement & Dinges, 2005: 650), metaboliese sindroom (Javaheri, 2005: 1158), kardiovaskulêre siekte (Palmer, 2008: 1; Dinges, Rogers & Baynard, 2005: 74; Somers & Javaheri, 2005: 1180; Walsh, Dement & Dinges, 2005: 649) en veranderde immuun respons/reaksie kan lei (Krueger & Majde, 2009: 223; Dinges, Rogers & Baynard, 2005: 73). Daar is geen wetenskaplike bewyse dat Down Sindroom deur gereelde onderbroke slaap aangebring of verhoog kan word nie. Down Sindroom (Trisomie 21) is ‘n chromosomale versteuring wat lei tot geestelike vertraging en fisieke abnormaliteite (Liptak, 2008: 1).	
11	Resorteer snork binne die spektrum van slaap siektes? ☐ Nee ☑ Ja ☐ Onseker *Korrekte antwoord:* Mehra & Strohl (2009: 73) en Mathew (2008) stem saam dat primêre snorking, soos getabelleer in die Internasionale Klassifikasie van Slaap Versteurings, binne die omvang van slaap versteurings val. Vaughn en D’Cruz (2005: 596) verklaar dat snorking ‘n kardinale manifestasie van ‘n slaap versteuring is.	

12	Word Obstruktiewe Slaap-apnee verbind met ’n verhoogde risiko van swak gesondheid en die dood? ☐ Nee ☑ Ja ☐ Onseker *Korrekte antwoord:* Obstruktiewe Slaap-apnee is algemeen en kan morbiditeit en dood as gevolg hê (Hahn, Olson & Somers, 2009: 95; Phillips & Kryger, 2005: 1109).	
13	Sirkadiese ritmes in mense, insluitend slaap-wakker siklusse, word geinisieer van die Suprachiasmatiese Nukleus (SCN). In watter deel van die brein is die Suprachiasmatiese Nukleus geleë? ☐ Agter hipothalamus ☑ Voor hipothalamus ☐ Onseker *Korrekte antwoord:* Sirkadiese ritmes in soogdiere, slaap-wakker siklusse insluitlik, word endogenies gedryf deur die Suprachiasmatiese nukleus (SCN) in die voorste deel van die hipotalamus (Rosenthal, 2009: 11; Gooley & Saper, 2005: 335; Turek, Dugovic & Laposky, 2005: 318).	
14	Watter omgewings faktor beinvloed hoofsaaklik die sekresie van die pineale hormoon, Melatonin? ☐ Lig ☑ Donker ☐ Onseker *Korrekte antwoord:* Die hormoon melatonin word by mense hoofsaaklik afgeskei deur die pineale klier gedurende die ure van donker (Arendt, Stone & Skene, 2005: 664; Scheer, Cajochen, Turek & Czeisler, 2005: 395).	
15	Verskille in slaap vereistes vir gesonde volwassenes word beïnvloed deur omgewing, geneties en sosiale faktore. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Epidemiologiese, sowel as eksperimentele studies wys na ‘n hoë variasie in die duur van slaap vir gesonde volwassenes, wat beïnvloed word deur omgewings, genetiese en maatskaplike faktore (Dinges, Rogers & Baynard, 2005: 67).	

16	By die ouer volwassene word deteriorasie van slaappatrone waargeneem en lei tot gefragmenteerde slaap in die nag, met verhoogte slaperigheid en slaap gedurende die dag. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Daar is ‘n herorganisasie van slaap rondom die 24 uur dag in die ouer volwassene met ‘n onderbroke nagtelike ontwaking en ‘n toename in slaap bedags (Ayalon & Ancoli-Israel, 2009: 173; Ancoli-Israel, 2004: 37).	
17	Die twee proses model stel voor dat die tydsberekening van slaap en wakker word bepaal deur die interaksie tussen proses S (afhanklik van duur van vorige slaap en wakker word), en proses C (sirkadiese proses). ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Die twee proses model veronderstel dat “die tydberekening van slaap en wakker word bepaal deur die interaksie tussen proses S en proses C. Daar word geglo dat die aanvang van slaap plaasvind wanneer beide die homeostatiese (proses S) en die sirkadiese dryfkrag (proses C) van slaap oorkruis” (Rama en ander, 2009: 4; Turek, Dugovic & Laposky, 2005: 319).	
18	Babas se slaap word verdeel in REM slaap, NREM slaap en onbepaalde slaap. ☐ Onwaar ☑ Waar ☐ Onseker *Korrekte antwoord:* Slaap in babas/pasgeborenes is verdeel in REM slaap, NREM slaap en onbepaalde slaap (Rama en ander, 2009: 2).	
19	Nuwe babas se slaap siklus is gemiddeld 120 minute. ☑ Onwaar ☐ Waar ☐ Onseker *Korrekte antwoorde:* Die pasgebore/nuwe baba se slaap siklus is ongeveer 60 minute (Rama en ander, 2009: 2). Die slaap siklus neem geleidelik toe van die ouderdom van 6 maande tot die volwassene gemiddeld van 90 minute (Rama en ander, 2009: 2).	

20	Wat is die fisiologiese funksie van Melatonin in mense, betreffende slaap? *Korrekte antwoord:* Volgens Lee-Chiong en Sateia (2009: 39), Gooley en Saper (2005: 335, 345) en Scheer, Cajochen, Turek en Czeisler (2005: 398), is daar gewys dat melatonin ‘n hormoon is wat slaap in mense bevorder.	
21	Lys so veel as moontlik van die omgewings faktore binne in die hospitaal wat onnodiglik pasiënte onderbroke slaap laat ervaar. Lei en ander (2008) identifiseer die volgende faktore wat nagtelike slap van pasiënte affekteer: geraas; verpleeg versteurings; ongemak verwant aan siekte prosesse; urinering; ontlasting; medikasie; familie verlange; verveling en gebrek aan selfbeheersing. Bonnet (2005) en Morin (2005) verwys nie na die hospitaal omgewing nie, alhoewel hulle voorstel dat verskeie omgewingsfaktore onderbroke slaap mag veroorsaak. Sommige van hierdie faktore word onder gelys. Die gebrek van higiëne is nie ingesluit nie. *Potensiële korrekte antwoorde:* • Lig: helder/onbekende beligting (Friese, 2008; Doğan en ander, 2005; Walder, Francioli, Meyer, Lançon & Romand, 2000; Southwell & Wistow, 1995; Hilton, 1976). • Geraas/versteuring: medikasie rondtes, dokter se rondtes, verpleegster rondtes, ander pasiënte, telefone, gereedskap, bouwerk buitekant, besoekers (Lei en ander, 2009; Friese, 2008; Doğan en ander, 2005; Cmiel en ander, 2004; Frisk & Nordström, 2003; Freedman, Gazendam, Levan, Pack & Schwab, 2001; Walder en ander, 2000; Southwell & Wistow, 1995). • Onvoldoende analgesie: pyn is ‘n teken van onvoldoende analgesie (Lei en ander, 2009; Friese, 2008; Patel en ander, 2008; Frisk & Nordström, 2003:; Southwell & Wistow, 1995). • Medikasie: medikasie wat slaaploosheid veroorsaak en slaaploosheid as newe-effek het, die korrekte tydsberekening vir toediening van slaap tablette (Friese, 2008; Patel en ander, 2008; Berlin, 1984). • Ongemak: onvoldoende ventilasie; onvoldoende voeding en/of hidrasie (honger en dors); ongemaklike/vreemde bed; kussings en beddegoed; traksie; behandeling en medikasie apparaat; versuim om blaas leeg te maak voor slaap; emosionele ongemak as gevolg van vreemde omgewing en roetine; angs weens gebrek aan fisiese kontak met troeteldier of geliefde; gebrek aan higiëne: vreemde/onplesierige reuke, nat vuil beddegoed, insekte; binneaarse terapie; neus-gastriese pype en kaffeïen verminder slaap (Lei en ander, 2009; Friese, 2008; Frisk & Nordström, 2003; Fontaine en ander, 2001). • Omgewings temperatuur: te warm en/of te koud (Doğan en ander, 2005; Fontaine en ander, 2001).	

	Die respondente se antwoorde op Vraag 21 was gekategoriseer in die volgende groepe vir die doel van boekstawing: 21a) Lig; 21b) Geraas/versteurings; 21c) Onvoldoende analgesie; 21d) Verkeerde tydsberekening van die toediening van medikasie, veral medikasie wat slaaploosheid veroorsaak; 21e) Ongemak; 21f) Omgewings temperatuur en slegte ventilasie; 21g) Gebrek aan higiëne; 21h) Pyn/pynlike prosedures; 21i) Stimulante.	
22	Wat is die fisiologiese funksie van elkeen van die volgende, met betrekking tot pasiënt se herstel in 'n hospitaal konteks? a. NREM slaap b. REM slaap c. Rus *Korrekte antwoord:* a. NREM Gedurende NREM, stel die menslike liggaam groei hormone vry vir die herstelling en hernuwing van epiteliale en gespesialiseerde selle soos brein selle (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51). b. REM: Dit wil voorkom dat REM slaap belangrik is vir kognitiewe restourasie (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51). c. Rus: Proteïen sintese en sel verdeling vir die vernuwing van weefsel vind plaas gedurende rus (Rosenthal, 2009: 13; Mathew, 2008; Horne, 1988: 51).	

23	Watter strategieë sal U as verpleegkundige gebruik om pasiënte beter in te lig en beter te laat slaap, in die hospitaal waar U werk? *Potensiale korrekte antwoorde:* Morin (2005: 728) stel die volgende strategieë voor as die primêre behandeling van algemene slaaploosheid: • Vermei stimulante 'n paar uur voor slapenstyd; • Vermei die verbruik van alkohol net voor slapenstyd, omdat dit onderbroke slaap mag veroorsaak; • Verseker geskikte daaglikse passiewe en aktiewe oefening; • Maak tyd om te ontspan vir 'n minimum van 1 uur voor slapenstyd; • Hou die slaapkamer omgewing stil, donker en gemaklik tydens slapenstyd; • Behou 'n gereelde slaap-wakker skedule en • Verwyder alle helder en dowwe beligting. Ander voorstelle volgens Mathew (2008) sluit die volgende in: • Implementeer 'n versorgingsplan wat aan onderbroke slaap patrone verwant is; • Verseker voldoende voeding (Hogson, 1991) en • Verseker voldoende ventilasie. Verdere voorstelle in die literatuur suggereer: • Onderbreking van pasiënt aktiwiteite teen die voorgestelde tyd (Morin, 2005); • Laat 'n pasiënt se geliefde toe om snags langs die pasiënt se bed te bly (Fontaine en ander, 2001; Berlin, 1984); • Neem kulturele gewoontes in ag (verseker dat elke pasiënt sy eie, gemaklike bed het soos per kultuur), (Eugene, 2006; Bower, 1999); • Pasiënt geskiedenis sal menopouse/swangerskap simptome openbaar (Driver, 2009; Moe, 2005); • Laat toe dat 'n gunsteling troeteldier die pasiënt besoek (Coakley & Mahoney, 2009; Fontaine en ander, 2001; Brodie & Biley, 1999; Wiley, 1999); • Verwyder alle helder en dowwe beligting (Doğan en ander, 2005; Fontaine en ander, 2001; Walder en ander, 2000; Southwell & Wistow, 1995; Hilton, 1976); • Verwyder selfone, rekenaars en televisie beligting teen slapenstyd (Friese, 2008; Morin, 2005); • Verseker minimale of verkieslik geen geraas (Cmiel en ander, 2004; Stanley-Hermanns & Miller 2002; Freedman, Gazdam, Levan, Pack & Schwab, 2001; Walder, Francioli, Meyer, Lançon & Romand, 2000; Southwell & Wistow, 1995); • Verseker pasiënt gemak aangaande omgewingstemperatuur gedurende die slaap en rus periode (Fontaine en ander, 2001; Southwell en ander, 1995); • Verseker higiëniese kondisies soos 'n skoon en insek vrye matras, kussings, beddegoed, slaapklere en omgewing (Fontaine en ander, 2001), • Fasiliteer ligfietse postuur met kussings tussen of onder knieë (Caine, 2003); • Laat alle stimulante 6 ure voor slapenstyd uit (Hyde, Roehrs & Roth, 2009);	

- Verseker dat medikasie toedieningstye (insluitend medikasie vir pyn) die slaap periode fasiliteer (Patel en ander, 2008; Doğan en ander, 2005);
- Verkry pasiënt *buy-in* ten opsigte van die noodsaaklikheid van slaap (Bonnet, 2005);
- Verskaf sagte, ontspannende musiek na wat die pasiënt verkies, indien die pasiënt in ‘n enkel kamer is (Deshmukh, Sarvaiya, Seethalakshmi & Nayak, 2009; Lai & Good 2005; Fontaine, Briggs & Pope-Smith, 2001);
- Reël terapeutiese massering (komplimentêre/alternatiewe therapie) met die pasiënt en dokter se toestemming (Nelso & Coyle, 2010; Nerbass, Feltrim, de Souza, Ykeda & Lorenzo-Filho, 2010; Robinson, Weitzel & Henderson, 2005; Morin, 2005; Fontaine en ander, 2001);
- Luister na die pasiënt se kommernisse (Caine, 2003; Fontaine en ander, 2001; Southwell en ander, 1995);
- Stel die pasiënt gerus (Caine, 2003; Southwell en ander, 1995);
- Verduidelik alle beplande verrigtinge (Closs, 1988);
- Wees vriendelik teenoor die pasiënt/verminder angstigheid (Robinson en ander, 2005; Richards en ander, 2003) .
- Sluit die gesinslede of geliefdes in by besoeke en verduidelikings met die pasiënt se toestemming (Richards en ander, 2003; Fontaine en ander, 2001).

Bonnet (2005:52) bied bewyse wat verwant is aan verwekking beïnvloeding waarvan die onderwerpe insluit: aktiwiteite, helder lig, geraas, temperatuur, postuur, dwelms, belangstellings, motivering en herhaalde periodes van slaap verlies. Daar word verder gesuggereer dat die subjek se karakter eienskappe oorweeg moet word. Hierdie karakter eienskappe sluit in: “genetiese neigings, persoonlikheid, psigopatologie, motivering, belangstelling en ouderdom” (Bonnet, 2005: 54).

Die strategieë was gekategoriseer in die volgende groepe vir boekstawings doeleindes:

23a) Minimaliseer geraas/versteurings;
23b) Minimaliseer lig;
23c) Weerhou die gebruik van stimulante;
23d) Verseker gemak;
23e) Verminder/verwyder pyn;
23f) Stel gerus/verduidelik;
23g&h) Bevorder alternatiewe en komplimentêre terapie;
23i) Sluit geliefdes/bekende items in;
23j) Korrekte tydsberekening van toegediende medikasie;
23k) Luister na die pasiënt se kommernisse;
23l) Bevorder passiewe/aktiewe oefeninge gedurende die dag;
23m) Verskaf voldoende voeding en hidrasie;
23n) Bevorder gereelde slaap/wakker patrone;
23o) Bevorder higiëne;
23p) Verskaf voldoende ventilasie;
23q) Verseker veiligheid van die pasiënt;
23r) Skryf ’n sorgplan en implementeer dit.